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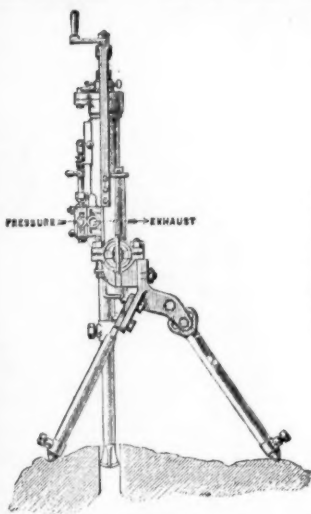
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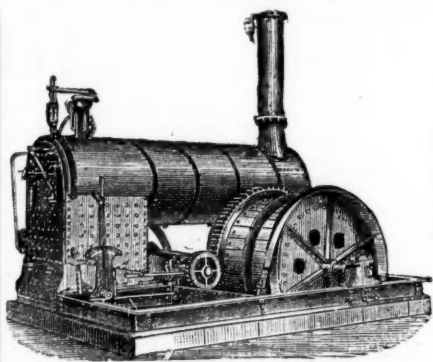
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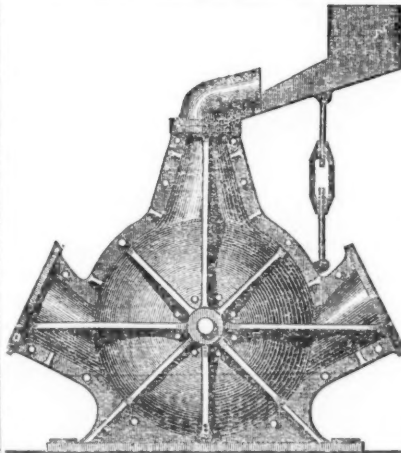
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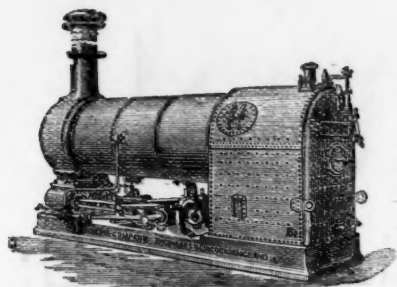
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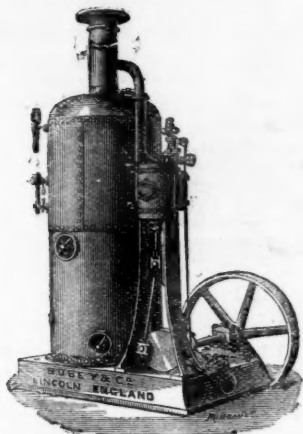
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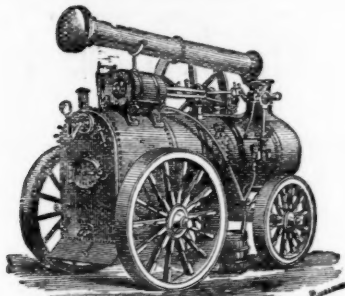
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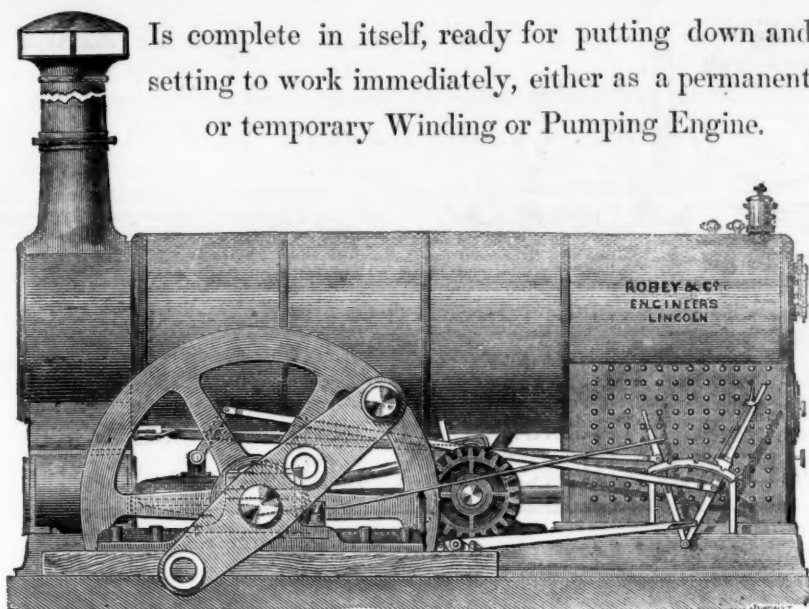
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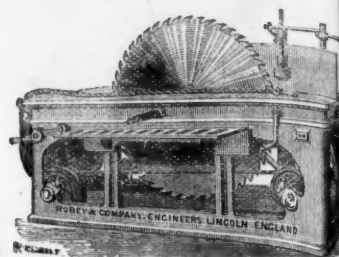


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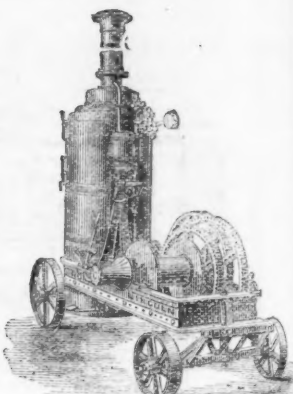
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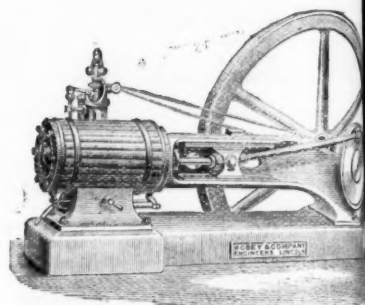
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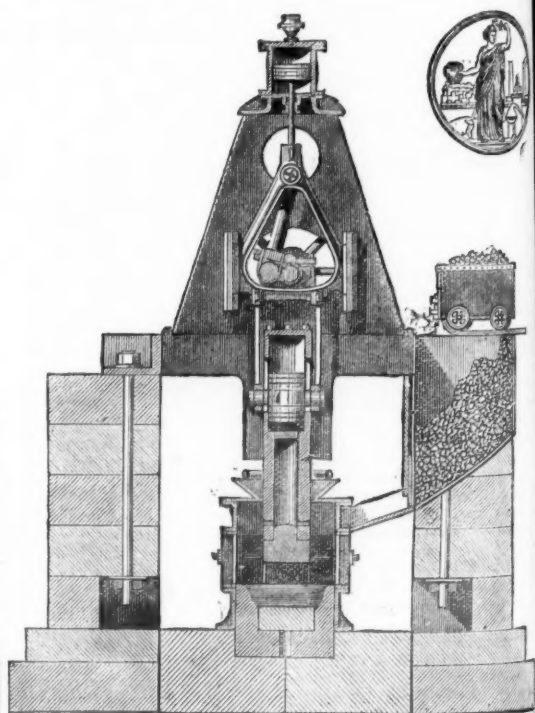
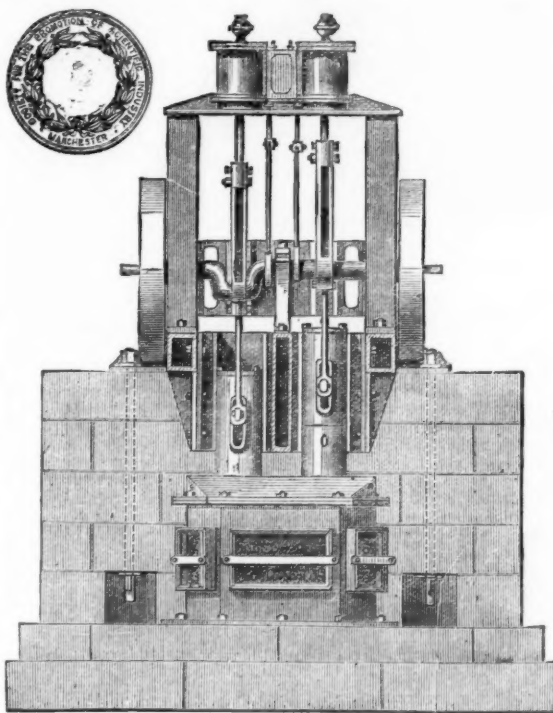
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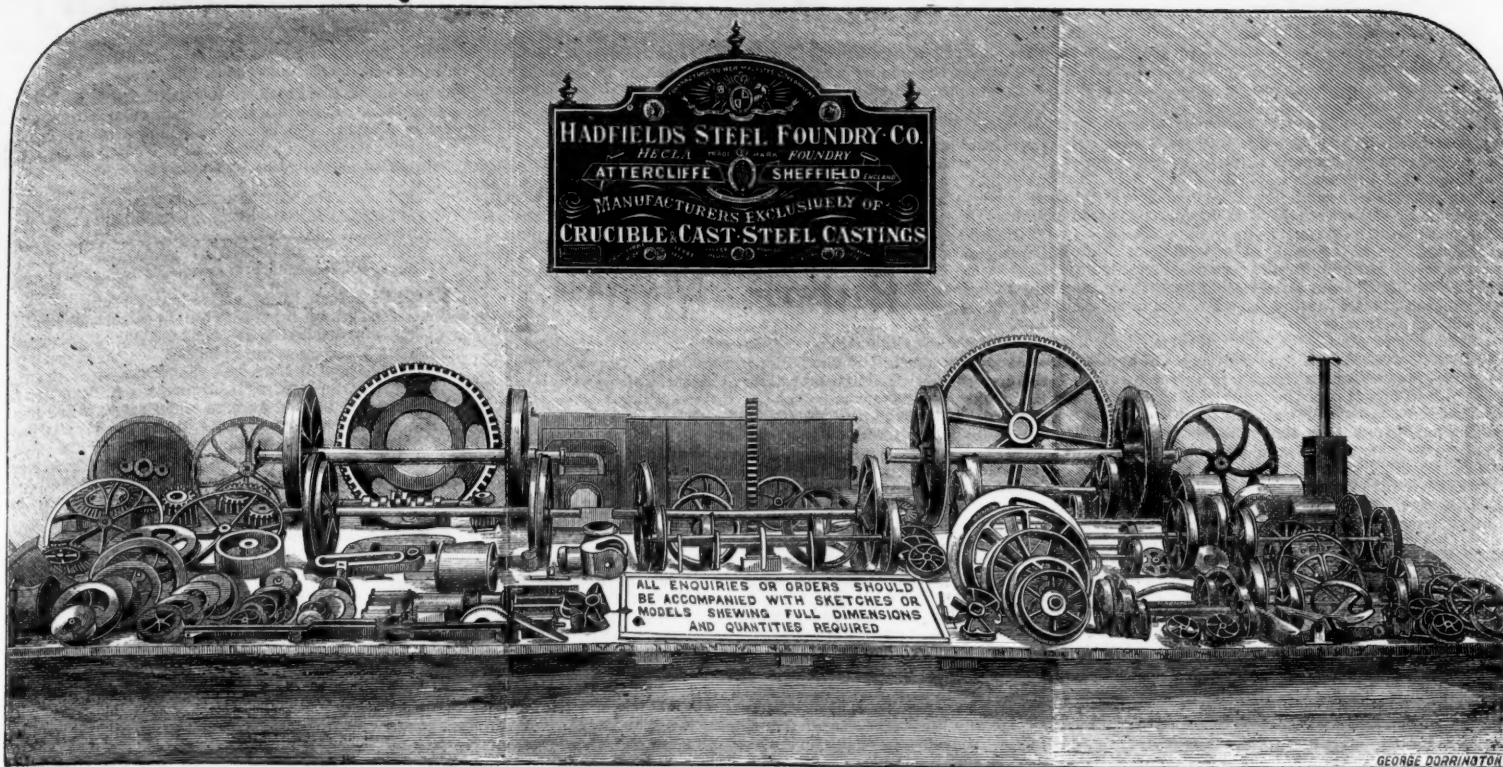
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IMPROVEMENTS IN WHEELS AND PULLEYS.



THE SYDNEY EXHIBITS OF THE HADFIELD STEEL FOUNDRY COMPANY.

IMPROVEMENTS IN WHEELS AND PULLEYS.

Probably no growth of modern times has had such a stimulating effect upon the mechanical industries as the rapid development of railway enterprise which has characterised the latter half of the present century. It is certain that but for the increased demand which has given rise to improved appliances for conveying passengers and goods from place to place the list of modern inventors would lack many of the names that adorn it, and would be shorn of much of the glory which it has contributed to the history of civilisation. That modern necessities should have given rise to keen competition amongst improvers of railway appliances and machinery, as well as amongst inventors in other branches of mechanical industry, is not to be wondered at, and much less to be deplored. Hot controversies, which have nothing to equal them in the domains of politics, philosophy, and religion, agitate the railway world in this age of telephones and Atlantic cables; and no invention, whatever its merits may be, can hope to achieve success unless it have vitality enough to carry it through a whole literature of criticism and polemic. The battle still rages between the merits of coupled and single engines; between self-acting vacuum, mechanical, and pneumatic brakes; and between a host of inventions which contemplate needed improvements in railway appliances and systems of works. There is probably no light so fierce—certainly none so healthy in its influence—as that which beats upon railways; and while directors continue to be enterprising, and inventors numerous, the travelling public will reap the advantage of increased safety and comfort in their journeys over the iron road. But while controversy may choose for its legitimate object most of the inventions which, while in perfect agreement as to the end sought, only differ from each other with regard to the means by which that end is to be attained, there need be no difference of opinion where inventors, proceeding upon generally recognised principles, introduce improvements which afford little or no scope for variety of method. Increase in the durability of machinery, for instance, is always a desirable end; and in the case of railway appliances, the demand for improvement in this direction is one of paramount importance. Directors may hold a variety of opinions regarding the comparative remunerativeness of goods and passenger traffic, or the degree to which various kinds of break action influence the wear and tear of line and rolling stock; but they are quite agreed as to the desirability of giving the maximum amount of strength and durability to all kinds of railway machinery.

The credit of fostering this very praiseworthy tendency on the part of railway companies must be distributed over a tolerably wide area, but much of it is due to firms like the Hadfield's Steel Foundry Company, who, by dint of careful experiments, inventive skill, and practical knowledge of all kinds of machinery, have succeeded in introducing a number of very valuable improvements of the character under discussion. The company named have obtained a well-deserved reputation for crucible and cast-steel castings, and one of the latest specimens of their skill has just been turned out from their Sheffield foundry in the shape of a new railway wheel, which has come to be widely known as the "Hecla" (Hadfield's Patent). When it is stated that the new wheel is made in one piece of the very best steel, it will be quite easy to understand that it possesses advantages to which ordinary wheels can lay no claim. The "Hecla" steel wheel has much more than the usual elasticity of railway wheels, and being better capable of withstanding shocks, and resisting the sudden application of brake power, is practically indestructible. Wheels have their lifetime like individuals, and, as in the case of human creatures, much depends upon the way in which they have been made up, as well as upon the materials of which they are constructed. The "Hecla" wheel is made so as to utilise the whole of the steel into the wheel tread. Under the old system—a system greatly in vogue even now—only a small portion of the tyre could be utilised for actual wear, and the wheel had to be its periphery, secured by fastenings, which are always in danger of getting loose, stretching, or bursting in the course of ordinary wear. The "Hecla" steel wheel has no tyre fastenings, and the tyre may be worn down to the wheel centre without any of those accidents to which the tyres of ordinary wheels are subject. Even when the steel tread is completely worn out, by turning off the flange to the level of the tread, a new tyre can be struck on or fastened thereto, thus making a new wheel of the old one, with the result of great economy, and a practical doubling of the life-period of an ordinary tyre. The "Hecla" steel wheels are extremely graceful in appearance, and with immense strength, non-liability to breakage at points and crossings, and great durability, they combine that desideratum of railway machinery, extreme lightness. Before bringing this paragraph to a close it should be stated that the Hadfield's Steel Foundry Company have also produced a superior class of tramway-car wheels, which possess all the advantages claimed for the railway wheels just described. The extreme hardness of great changes in tramway locomotion give exceptional importance to improvements of the kind under notice, and from the success which they have already gained, one would be inclined to augur an important future for the "Hecla" steel tramway carriage wheels. Best cast-steel is used in the construction, and the wheels are only half the weight of American wheels.

Another speciality of the Hadfield's Steel Foundry Company is the manufacture of steel rollers and pulleys for use in mining or other engineering operations, and wherever wire ropes and chain are employed. Much of the cost of renewing plant in collieries, ironstone mines, lead and copper mines, quarries, &c., is made up of expenses

caused by the rapid deterioration of the wires, cables, and ropes used in hauling and transmission of power from point to point. The rope used is two often made the scapegoat for a large expenditure under this head, while the real cause of the deterioration—the friction of the rope against metal rollers which through wear and imperfections, have become unequally thick and lob-sided—is too often overlooked. The steel rollers and pulleys, manufactured at the "Hecla" foundry, are not only extremely light, lessening the strain upon the ropes, and effecting a great saving in haulage power, but they are equally balanced, not lob-sided, and revolve readily when touched by the rope. It is claimed for them that though from one-third to one-half lighter than cast-iron, they cannot be broken by any of the ordinary shocks to which rollers and pulleys are liable. Moreover, each is guaranteed to outlast about twelve of the ordinary iron rollers, the wear and tear being reduced to an absolute minimum. For the manufacture of these wheels the company have a specially adapted department, capable of turning out 2000 wheels per week. They have also brought out, in connection with this department, an interesting invention in the shape of a new method of fitting wheels upon axles, by which a much lighter and stronger wheel and axle may be employed, and a more reliable and cheaper fastening obtained than by any other process. By the ordinary method of fastening wheels upon axles, wedges and keys of various kinds become necessary, and the fitter frequently has to resort to boring and slotting, and to the use of iron hoops, cotters, bolts, nuts, washers, collared axles, &c. It is hardly necessary to state that almost all systems of keying and wedging involve the disadvantage of gradual loosening of the wheel and axle. In the method under notice, however, the appliances named are altogether dispensed with. The axle holes in the bosses of the wheels are, for a short distance, cast round, the remaining and greater portion being left a slightly tapered square. The axles are forged from plain round bar to a corresponding shape at each end, and then, by means of powerful machinery, the wheels are pressed upon these square ended axles, and are afterwards slightly rivetted—a method which gives extra strength to the axle entering the boss of the wheel. In the case of wheels fitted for outside bearings a similar method is adopted, with the exception that the axle holes and the bosses are octagonal in shape, with axles forged to suit, and project upwards, instead of being rivetted up. Wheels or axles wearing out, bending or breaking, can easily be unfitted and replaced. Some idea of the superiority of this method may be gained when it is stated that upwards of half a million of wheels and axles fitted by Hadfield's patent fast method are now in daily use in Great Britain and abroad without any breakages.

The problem of oiling wheels when once in work offers many difficulties for solution. By the old system of lubricating loose wheels much of the oil used fails to reach the wearing surfaces; and when once these become dry the bosses of the wheels and axle bearings grind each other, causing great wear and tear and consequent expense. All these defects are remedied by "Hadfield's patent self-oiling steel wheels," which are, by their construction, specially adapted for collieries, ironstone mines, slate quarries, lead and copper mines, and all processes where loose wheels revolving upon their own axles are required. By the new method the part of the wheel which immediately surrounds the axle is made hollow; the cavity is supplied with oil through a charging screw, and the lubricating material obtains access to the axle through a continuous opening on the inner side of the hollow chamber. This method secures a saving in the grease or oil used, the consumption being about two-thirds less than that involved by any other method. The oil is drawn out as required by the revolution of the wheel, and the moment the motion stops the lubricator ceases to act. When wagons are not in use, it is impossible for the grease to escape; nor can there be any waste in whatever position the wagon may be when discharging its contents. A single charging with lubricating material suffices for several weeks with continuous work. Being made of crucible steel, the wheels unite great durability with extreme lightness, simplicity of construction, and non-liability to get out of order.

In concluding this notice, it should be stated that the Hadfield's Steel Foundry Company were awarded the only gold medal at the Paris Exhibition of 1878 for crucible steel castings, the first prize medals at Leeds, Manchester, and Wrexham Exhibitions of 1875-6, and the highest award at the Mining Institute of Cornwall in 1877. Their latest triumph has been gained during the present year in the shape of the first prize awarded (gold medal) to them at the Sydney (New South Wales) Exhibition. In connection with this latter award, we have great pleasure in giving our readers an engraving (prepared from a photograph taken on the spot) of the Sydney exhibits of the company. It may be as well, after giving prominence to details of construction and to the objects kept in view by the makers of Hadfield's steel wheels, to refer to the experience of those manufacturers, firms, and companies who have put the new wheels to the test of a very severe trial extending over a number of years constant work. The decreased haulage power which accompanies their use has proved one of the most satisfactory features of working with these wheels, and in the case of large collieries, with a daily output of 800 to 1000 tons, the saving effected is not only considerable but surprising. In consequence of the extreme lightness of their construction, tram wagons made of iron and steel have begun to be largely used in preference to the old wooden wagons, with their cumbersome and heavy wheels of cast-iron. In regard to durability it would be difficult, almost impossible, to estimate the wearing life of these wheels. The

company, though running wheels in the North of England that have been in use upwards of ten years, have never known of any being worn out. This statement would justify scepticism were it not supported by the most unquestionable and convincing testimony. In one case a set of 9 in. wheels and axles fitted by Hadfield's patent fast method, after running 41,000 miles, carrying nearly 10,000 tons, and being in constant work for five years, were found to be worn little more than $\frac{1}{8}$ in. on the tread! In another case a contractor's wheel, 30 in. diameter, which ran 11,000 miles, and carried 33,000 tons of earthwork, was only worn $\frac{1}{8}$ in. on the tread! These are two examples out of thousands of cases in connection with which the company are prepared to furnish authentic references. Of the strength of the wheels, the most astonishing evidence has been given. They have come uninjured out of such serious mishaps as collisions, run-aways down inclines, &c. In one case a set of wheels fell from the top to the bottom of a shaft 1320 ft. deep, and were practically undamaged. This firm has in work daily nearly 900 sets, and though the majority of these have been in use for over four years, no breakage from any cause has yet occurred. In regard to Hadfield's patent method of fitting wheels upon axles, it should be stated that the new system has successfully stood the crucial tests applied to it during the many years in which it has been in use, and that none of the wheels according to this patent have ever come loose or been rendered unserviceable by any of the ordinary accidents of working. Of the patent self-oiling or lubricating wheels, it will suffice to say that the thousands now at work are giving great satisfaction, and are effecting a saving of from 20 to 50 per cent. in the quantity of lubricating material used previous to their adoption. This company also supply all classes of general steel castings from 10 lbs. up to 5 tons in weight.

NEW EXPLOSIVE COMPOUND.

A composition consisting of 3 parts of nitro-phenol, with 15, 9, or 3 parts of chlorate of potash, and 3, 2, or 1 part of coal tar or mineral tar, the first proportions being very strong and the others less so, has been patented by Mr. MAX TSCHIRNER, of San Francisco, California. In using these ingredients the nitro-phenol and chlorate of potash are first ground to a proper degree of fineness by trituration in a mortar or other utensil for the purpose, and then intimately mixed with the coal tar by stirring separately the fine nitro-phenol first and the chlorate of potash afterward therein, by which a product is formed having about the consistency of dough, but much tougher and stronger. In place of the chlorate of potash the perchlorate, manganate, permanganate of potash, or other alkaline base may be employed in about the same proportions as above set forth, to provide a stronger or weaker explosive according to the nature of the work to be performed. By this means he provides an explosive compound which is not affected by moisture, dampness, or water, and one that can be exploded under water. The coal tar holding and surrounding the particles of nitro-phenol and chlorate of potash mechanically prevents all moisture from penetrating the mass. He explodes the compound usually by a percussion cap in the usual way, but it may be exploded by fire applied in the usual way and manner, which is too well known to need explanation in this connection.

But the great recommendation of the explosive is the purity of the evolved gases. Mr. Tschirner has found by repeated experiments that the foul gases so incident to the explosion of other compounds, specially in mines, and which is so dangerous to human life by the generation of nitrous or noxious gases, are not present in the explosion of his compound, which fact enables the miner to remain without injury in the tunnel or mine with impunity after a blast has been let off. Furthermore, the ingredients separately or in themselves are absolutely innoxious, and consequently the manufacture is divested of much of the danger so incident to the manufacture of other explosives.

It should here be observed that an increase of heat or temperature will not produce spontaneous combustion of his compound as in case where picrate salts enter the combination as one of the ingredients in the manufacture of explosives, and hence he does not wish to employ picrate salts. He is aware that explosive compounds consisting of chlorate of potash with earthy and other substances as a base have been used. He is also aware that adhesive substances, such as asphaltum or a non-absorbent compound, have been used to coat the grains of powder when formed, but is not aware that nitro-phenol has been used in combination with any other ingredient whatever as an explosive, or that the other two ingredients of this composition have been used together.

CORNISH PUMPING-ENGINES.—The number of pumping-engines reported for May is 16. They have consumed 1685 tons of coal, and lifted 12.5 million tons of water 10 fms. high. The average duty of the whole is, therefore, 49,900,000 lbs. lifted 1 ft. high by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:—

	Millions	52.2
Carn Brea—76 in.	62.7	
Dolcoath—85 in.	53.9	
Mellauar—Gundry's 80 in.	52.4	
West Basset—Grenville's 70 in.	55.5	
West Tolgus—Richard's 70 in.	54.6	
West Wheel Seton—Harvey's 85 in.	61.7	
West Wheel Seton—Rule's 70 in.	64.8	

Original Correspondence.

THE GREAT GAS EXPLOSION.

SIR,—Some surprise has been expressed with regard to what has been called the erratic character of the recent fearful gas explosion near Tottenham Court-road, but it will probably be proved upon investigation that there is really nothing erratic about it, and that under the conditions which may be assumed to have existed nothing else was to be expected. The main which has exploded was not in use—of course a gas main filled with illuminating gas is absolutely safe—but was connected with the charged main at Howland-street. In its normal condition this new main would be filled with atmospheric air, but gas admitted through the Howland-street gate, whether intentionally or by leakage would, if in certain proportions, convert into a highly explosive mixture. Neither the production of this mixture nor the explosion of it upon ignition would constitute a phenomenon, and the result, although fatally dangerous and damaging by its effects, would be of little or no scientific importance, and would simply suggest that greater caution should in future be used to avoid the cause of such a calamity.

But the point of scientific interest is the intermittent and irregular action of the destructive force. There are two centres of action in Percy-street, the second much stronger than the first; these are both in the straight. The third centre is at the angle of Percy-street and Charlotte-street; the fourth at the point where Bennett-street forms a junction with Charlotte-street; the fifth and sixth at short distances from Howland-street. Centres 4, 5, and 6 are also in the straight. There appears to be no difference of opinion as to the ignition having occurred at or near the open end of the new main at Tottenham Court-road, the centres 1 to 6 having formed separate consecutive explosions, the largest crater being formed by explosions 2, 4, and 5. No. 3 was a fair one, but more limited in the range of damage than No. 4, which removed far more ground and heavier flagstones; and also more limited than No. 2, which was strong enough to project paving stones on to the coping stones of a three-storied house. I do not recollect whether there is another slight shiver between what I call No. 2 and No. 3, but it makes no difference to the argument. I have mentioned five on the straight and one at the angle, so that if one is missed it would only be an additional one on the straight.

Without seeing a drawing of the main showing connections, rise and fall, valve-gates, and other details only a very rough idea can be formed; but the No. 3 and No. 4 explosions would appear to be easily accounted for. It is probable that at both points there would be branches let in for carrying gas through Bennett-street and Rathbone-place respectively. If this be so there would be good lodgments for air in each place, and the gas admitted from the Howland-street valve-gate would pass those lodgments, leaving the air in them just as we know that in a colliery the ventilation will pass a foul working place without purifying it unless a brattice be carried up it. It is not difficult to imagine similar lodgments for air at centres 1, 2, 5, and 6, if it be assumed, which is not unreasonable, that the main had not been carefully cleaned out, and that consequently small heaps of dirt or other obstructions remained in the mains. At all events it would be worth while enquiring what precautions had been taken to ensure the main being thoroughly clean. As to how the gas got into the main is really a question of secondary importance, inasmuch as the fact of the explosions being consecutive, as it is reported they were, proves that there was an absence of uniformity in the explosive mixture. With uniformity one would expect an almost simultaneous explosion, and a pretty uniform ripping of the main, but nothing of the kind is observable; there has been a series of separate forces with quiescent regions separating them.

The condition of things actually observed after the explosion would be fully accounted for upon the assumption of lodgment of air. Having so large an area as 3 ft. main the ignition of a fairly explosive but uniform mixture would in all probability either have ripped the main like a paper tube or would have blown out harmlessly like a squib or safety fuse, for the air pressure on the open end would always be smaller than the pressure represented by the strength of the main, and there is nothing to lead us to expect that air would come like sand, and thus form the necessary tamping to enable the force to break the main. But with air lodgments the effect would be quite different. Upon the ignition of the combustible but non-explosive (though probably nearly explosive) mixture at Bailey-street the flame would run as in a fuse as far as the first air lodgment, where the small addition of air would result in a powerful explosion, and the next body of combustible but non-explosive gas being ignited the same process would be repeated until near the Howland-street valve gate is reached, when even a small compression of the more nearly pure illuminating gas would arrest further progress. In proportion as the lodgment of air at each centre of action was or was not that necessary to bring the mixture to the maximum explosive condition so would the destruction done be greater or less. Whether this view be correct or not it is at least worth some consideration before the enquiry be closed.—July 8.

BIRCHILLS HALL BOILER EXPLOSION.

SIR,—The enquiry into the cause of the boiler explosion at Birchills Hall Ironworks terminated on June 26, when the jury gave their verdict. The facts bearing on the explosion seem to have been carefully investigated. Evidence and reports were given by Mr. E. B. Marten, engineer to the Midland Insurance Company, Mr. McDougall, engineer to the Boiler Insurance and Steam Power Company, with which company the exploded boiler was insured; evidence was also given by Mr. W. F. Traill and Mr. T. J. Richards, appointed by the Board of Trade. The following is the substance of the verdict:—That the 25 persons came by their death on May 15 through the explosion of No. 4 boiler. They find that the hard firing the boiler was subject to day and night, the thinning of several of its plates by corrosion, and the frequency of repairs on these plates, brought the boiler into a state too weak to withstand the working pressure, which they thought exceeded 30 lbs. (the proper pressure), and probably at times rose to 40 or 60 lbs. to a square inch, and about this pressure it exploded. They consider the safety-valve too small for a boiler of 10 ft. diameter. The Birchills Hall Iron Company were much to blame in using the boiler in the manner they have been doing after the repeated cautions of the Boiler Insurance Company. The boilers have not been managed by a competent engineer. From the want of steam and water indicators upon the boiler, the incorrectness of those placed in the engine-house and on one boiler, No. 8, and from the load on the safety-valve being more than the boiler could bear with safety, the jury were of opinion that these defective arrangements show the necessity of Government instituting regulations for the management of steam boilers in general.

The dimensions of the No. 4 Rastriek boiler—concerning which the enquiry was made—have been already given in the *Mining Journal* of June 5. Mr. McDougall in his evidence states that the safety-valve, of 5½ in. diameter, was large enough; also, that a while before the explosion (in November, 1879) some of the plates of No. 4 boiler were taken out, and were found to be only 1-16 in. thick; these were substituted by new plates, and some time after the boiler exploded. This goes to show either that the boiler at the moment of explosion must have been subjected to much higher pressure than usual, or if the pressure were the same some other part had given way which must have been weaker than even in the critical state in which it was found in November, 1879. Mr. McDougall gives the pressure that plates 1-16 in. thick will bear (at 18 tons to a square inch), as sufficient for 30 lbs. per square inch in a boiler of 10 ft. diameter. He states that the plates and angle irons about the orifices of the cross tubes were excessively strained, owing to unequal expansion of the shell and cross tubes; this action had led to the necessity for frequent patching at these parts.

Another noteworthy circumstance came out in the evidence, that the position of the float had recently been altered, and the water level lowered about 2 ft.; the effect of this was to bring the water level below the fuel line, and cause overheating at the middle part of the boiler, where the four cross tubes are fixed to the shell. At this part a riveted seam ran around the boiler, and the seam had been

caulked to a great extent, besides the many repairs and patches about the edges of the cross tubes. When the boiler exploded the upper portion flew away at this circular seam from the lower part; there is consequently good ground for supposing that the overheating at this middle part had so weakened the plates that rupture was the consequence. The loss of iron in strength and ductility when subjected to heat, even at comparatively low temperatures, is well understood, and iron of the quality used in the construction and repairs of this boiler, as proved by the tests to which portions of it have been put to, would be peculiarly liable to this action, arising from unequal expansion. The evidence further shows that the plates were not of good quality, and the boiler was bad in construction. Many rivet holes were not fair, and had been heavily drifted; very frequent repairs had been needed; besides which the boiler primed, scale was allowed to accumulate, all showing that it had not been worked under safe conditions. The safety-valve was overloaded at the time of the explosion. There was but one pressure gauge for this group of boilers, and one in the engine-room. A good pressure gauge on this boiler would have shown the overloading, the pressure allowed by the Insurance Company being 30 lbs.

Furnace boilers are peculiarly subject to overheating, and severe wear and tear from straining and wasting of the plates. The theory that the plates at the middle circular seam became overheated and weakened, so much that the boiler ruptured at this part is, perhaps, the correct one. The necessity of more careful supervision of boilers than appears to have been given in this case is much needed, more particularly when the heat from four puddling furnaces is made to act irregularly upon the boiler—an intense heat at one time, and comparatively low at another. The boiler at the first was structurally weak, and of a most dangerous type—fittings essential for the safety of boilers were not applied to it; added to this there was the continual wear and tear from overheating and other causes, all of which would necessitate a careful watching of the boiler daily, and frequent periodical inspections of the interior. It would appear that too much of the responsibility had been placed on the Insurance Company to the neglect of ordinary precautions being taken by the people of the works. At any event, there seems to have been an absence of that careful and skilful supervision which is imperatively needed in the management of ironworks boilers. It is to be hoped that as the Birchills Hall Iron Company have resolved to do away with their other Rastriek boilers that this type of boiler will disappear altogether at all other ironworks, and the safest forms be at once substituted for them. It will be the true interest of owners to adopt this course should the Legislature decide on compensation being made to workmen for injuries received from such accidents as seem to arise from negligent or unskilful supervision. From Mr. McDougall's statement the Insurance Company, it appears, do not profess to relieve the owners from responsibility, or making their supervision less careful and skilful than ordinary, and as there may be some misapprehension on the part of owners on this point, it would be well if conflicting opinions as to responsibility and examination of boilers should be more clearly defined. There was evidently a sad want of daily skilful supervision in this case. However carefully the company's inspector may have made his periodical examinations, perhaps monthly, it is clear that between those periods a great change in the condition of boilers subjected to high temperature may take place, and this could only be found out by the owners' agent or engineer.

AUTOMATIC FIRE-DAMP DETECTOR.

SIR,—I have just been reading the description of an automatic ventilator invented by Messrs. Jordan, of Gracechurch-street, and which as it has not been patented is open to anyone to use. For the purpose of an automatic ventilator for domestic purposes, and for indicating temperature, I do not think the suggestion is worth much, but if it could be arranged as a detector of fire-damp it might be useful, and as the general system could not now be secured by patent there would be no fear of heavy penalties to pay. The apparatus consists of a perfectly air-tight vessel, formed of very thin sheet metal, and of such shape that no alteration of capacity can occur in ordinary usage. This vessel is encircled by a tube also formed, by preference, of thin metal, which is bent into a circle, but its ends do not quite meet. One end is in air-tight connection with the hollow vessel previously described, and the other is open to the atmosphere. The whole is accurately balanced between centres, so that the circular tube can revolve in a vertical plane. A portion of mercury, more or less according to the size of the ventilator, is poured into the open end of the circular tube, which is uppermost, so that the mercury now collects in the lower portion of the circle on account of its gravity and fluid condition. It is pointed out that the instrument may be made of any size, weight, or power, and may be supplied with means of adjustment, so that it can be regulated to close or open the ventilator at any given temperature, and thus regulate the temperature of any chamber with great accuracy by checking or admitting the heating or cooling currents of air. Messrs. Jordan further state that as a safeguard against fire, gas explosions, or the rupture of vessels containing inflammable materials, the apparatus may be so fitted as to strike off an alarm detent under any sudden accession of temperature, or by any other mechanical means give audible notice of the accident. Steam from any steam boiler on the premises may be admitted by this detent or other mechanical appliances to extinguish the fire, or any fire extinguishing fluid may be released from a reservoir. Any such extreme accession of temperature will also serve to completely close the ventilator and stop the draught, and thereby check any combustion in the chamber. An incompressible liquid, such as alcohol, should be used in the closed sensitive vessel to indicate minute variations of temperature, as the action of a gas would be affected by barometrical changes. Judging from the whole of these statements, it appears to me that there would be very little difficulty in adapting the arrangement to the detection of fire-damp as I suggest.

Manchester, July 5.

GOLD AND SILVER MINES OF THE UNITED STATES.

SIR,—I promised in my first despatch to forward in my second a view of the past, present, and prospective yield of the gold and silver mines of the United States. This I will now proceed to do.

It is necessary beforehand to say something of the manner in which these statistics are obtained. There are several ways of doing this:—1. By returns from the various mines. Unless great personal exertion is coupled with this method it is bound to be unreliable. The number of mines and placer diggings is exceedingly great. Only the vein mines and the placers worked by hydraulic process are incorporated, and not all of these; the remainder being conducted by individuals, who are generally averse to giving information. In this respect even the corporations are not alacrity; moreover, the latter are not obliged to report to the United States authorities, but only to those of the State in which they are incorporated, and this is sometimes in distant States, and even in foreign countries.—2. By returns from the assayers and the Mints. Another incomplete method, because much of the precious metals is assayed by the miners themselves or their private assayers, and in this state shipped away. The record of deposits at the Mint cannot and do not always discriminate between old and new metal.—3. By deposits at the banks. Most of the metal taken from the mines is sold in the first instance to banking houses; but much of it is not, and this method is, therefore, as imperfect as the others.—4. By the record of shipments through the express or parcel carrying companies. This is the best of all the methods after certain allowances are made. All the metal from the mines, except the comparatively small amount of gold taken from abandoned places by Chinese miners, is shipped by express either to San Francisco or to some eastern city. Express agencies are established in connection with the railway and stage-coach lines in every town or mining camp in the country, even in the most inconsiderable places. The express receives the bullion in sealed packages, and agrees to deliver it at its destination, charging freight and insurance, and guaranteeing safety. Up to within a few years last past a single Express Company (Wells, Fargo, and Co.) enjoyed the monopoly of this business. Now it is divided among several. The returns of these companies when taken collectively afford a correct view of the production; but certain allowances must first be made. Sometimes

a given package of bullion is shipped more than once over the same route. Sometimes bullion is shipped from town by private conveyance to a mine, and then shipped from the mine openly by Express, so that the shipment may appear in the newspapers, and give a false notion of the productive power of the mine or district. Making these and some other allowances, the character of which would be tedious to describe here, the Express returns afford a complete view of the bullion yield. This has been as follows:—

Production of the Precious Metals in the United States since 1875. Based on the Express returns of Wells, Fargo, and other companies after the elimination of certain errors. By careful computations by Alex. Del Mar, Mining Engineer, San Francisco. \$5 equal to 17. sterling:—

Year.	Silver.	Gold.	Together.
1876	\$38,200,000	\$40,000,000	\$78,200,000
1877	38,000,000	42,000,000	80,000,000
1878	36,000,000	36,000,000	72,000,000
1879	35,000,000	30,000,000	65,000,000

NOTE.—One silver dollar is equal to 371½ grs., and one gold dollar is equal to 23.22 grs. fine.

It will be observed that I have given round figures in every instance. The reason for this is that in calculations so vast and the precision is unattainable it is misleading to give exact figures and fractions. These figures may be relied upon as correct within a hundred thousand dollars, and that is the most that can be said of any figures of a great national production. The production of West Coasts of British America and Mexico, usually included in the Express returns from the United States, is excluded from this table. The outlook for 1880, so far as indicated by the production of the first five months, will not exceed that of 1879, and will consist of less silver and more gold. My estimate is \$30,000,000 in silver and \$35,000,000 in gold. Among the most promising districts for the production is Brodie for gold, and Candelaria for silver.

San Francisco, June 11.

ALEX. DEL MAR, M.E.,
United States Monetary Commission.

MINING IN NEW SOUTH WALES.

SIR,—A slow but steady revival is taking place in our mining industry; and, whilst some of the older fields are being at last systematically worked, newer ones are also being discovered and opened up.

In gold deeper sinking at Adelong is proving that good gold exists do no run out with depth, but rather the contrary. At Hill—once famous for its enormous yields at the 250 ft. levels—the of Peace Company has at last managed not only to secure the adjoining leases on the golden belt, but also all the ground to the east outside the other claims now at work, into which all the veins underlie; so that the best of whatever is worth working in the company's hands, and should the rich levels be again picked up in the deeper levels the seven years' patience, pluck, and perseverance of Mr. A. Fairfax and his partners in the venture will be a rich and merited return—as this is, perhaps, the one mining property in the colony which has been worked by business men, business principles, and tens of thousands liberally spent in unproductive work. In alluvial the Araluen Valley is also at last the result of Newman's "Underground Drain System," and the floods of last month not only did no permanent damage, but the Crown Company were actually able to work all the time, and as gold over 4 or 5 grs. to the lode is profit, there is a large and payable field before the various adventurers after their five years' pining and persevering efforts.

SILVER.—There is a discovery of some miles of country with silver-bearing lodes at Macleay river, within two or three miles water-carriage in some places; but, as only one or two shafts are down, and those only 20 or 30 ft., no really reliable result is known. Specimens (picked, of course) assayed from 2000 to 3500 ozs. of silver to the ton, whilst the main lode only showed an average of 8 or 9 ozs. of silver and 1 to 2 ozs. of gold—and the Secretary of Mines (Mr. Haine Wood) thought it of sufficient importance to send Mr. Lamont Young, the Government Geologist, to inspect and report (a copy of which report I will send you published). The Boorook Silver Mines, at Tenterfield, are also giving good results, and proper machinery and skilled knowledge would probably give much greater returns than any got at present by our comparatively rude methods and appliances.

COAL.—The owners of some of the Newcastle collieries have agreed to reduce the price from 14s. to 10s. per ton, and, as the wages were being lowered also *pro rata*, it will leave a handsome profit, especially to such of the companies as are lucky enough to own the Wallsend seam, as whatever ups and downs other collieries have this coal always commands the market, owing to its good character for gas, steam, or household use; and, as the area of it is not very large, and most of the land near Newcastle worked out or soon will be, the holders of the unworked blocks beyond and up to Lake Macquarie will have a good time of it and have it all their own way in the future.

IRON ORE.—At a few hundred feet beneath Sydney a trial has discovered a bed of ironstone of over 250 ft. thickness (in a spot nearer 400 ft.), samples of which assay from 45 up to 60 per cent. iron, and said to be of good quality; and, as small coal can be delivered at Sydney at 7s. 6d. per ton, the day is probably not far distant when we shall begin to smelt our iron ores, and supply the colonies with pig-iron.

As the railways are now rapidly opening up the colony will become a business easily supervised by directors and shareholders in the towns, and there is a growing field here for the investment of capital, the value and importance of which can scarcely be over estimated.—Sydney, May, 1880.

SILVER LODES—NEW SOUTH WALES.

SIR,—On the Macleay river, in this colony, a large extent of mineral land has lately been prospected and lodes traced for miles, said to be silver-bearing, more or less. A parcel of samples, assaying from 2000 to 3000 ozs. per ton has, I am informed, been sent to England said to be taken from a 2 ft. lode (running through 40 acres of Crown mineral lease), the inference, of course, being that the lode itself is thus rich, whereas the real fact is that the (carefully picked) specimens are taken from a thin patchy vein in the "dig," whilst the main body of stone will probably not average 10 ozs. of silver to the ton.

My chief object in writing this is to warn the English public generally and the parties in particular to whom these specimens are sent not to be misled by any statements made by interested parties and on no account to treat for this or any other mineral property any time unless there is a report on it from the Government Geologist here, stamped by the Mining Department of New South Wales. When, however, there is such a report it may be relied on, as the Government is fully alive to the importance of the matter; and Mr. Wilkinson and Mr. Lamont Young are gentlemen of sound knowledge and experience, and known to myself personally as reliable and conscientious, and utterly unlikely to be influenced by owners of mines, &c., to render a garbled report.

I go into this matter so fully because the mineral wealth of this colony is so great and so all but utterly undeveloped, and there is such a large and safe field for the investment of capital—that I have all higher considerations even out of the question, it is our policy to be honest, for we have not the money to work one-tenth of the known mines; and, therefore, it is the interest of every honest man to try and protect the interest of the home capitalist and investor. I subjoin a synopsis of Mr. Lamont Young's report (the full original of which I have read), by which you will see that there has not been work enough done to form any real judgment; but that the indications are promising, and probably sufficiently good to warrant investment for further exploration, especially as we in the colony are utterly ignorant of silver mining, and have only made a first assay at it at Boorook, where the returns as they deeper down are very good indeed:—

Mr. Lamont Young, Geological Surveyor, has forwarded to the Mining Mines a report upon the antimony and silver ores recently discovered in the neighbourhood of the Macleay river. He says the ores occur in rocks of Devonian age. The antimony ores occur in irregular bunches, occasionally

considerable size, enclosed in a quartz matrix. The lodes have a general strike between north and north-east; the Victoria reef, however, being a notable exception. The antimony minerals are represented by stibnite, or sulphide of antimony; and the cleavage faces of the crystals seen on breaking the ore agree of purity, and large. A smelting-furnace has been erected on the ore, by which the value of the minerals for the production of the finest antimony has been demonstrated. Several persons who have lodes near these works have let them on tribute, and it is evident from the nature of the deposits that a large extent of lode must be available in order to ensure a constant supply of ore. The silver-bearing lodes of the locality consisting of Devonian shale, interbedded with a broad belt of granite. The lodes are found in both the granite and shale, but chiefly in the latter. Many of them present a favourable appearance, being composed of several minerals, and having much of the vesicular or porous character, which is considered an encouraging indication by lode miners. Quartz character, which is predominant in their composition, while zinc, lead, iron and arsenical pyrites predominate in the granite. The stone at present raised is not very rich in pyrites, and galena also occurs. The stone at present raised is not very rich in pyrites, and galena also occurs. The stone at present raised is not very rich in pyrites, and galena also occurs. The stone at present raised is not very rich in pyrites, and galena also occurs.

R. D. ADAMS.

Sydney, May, 1880.
P.S.—In my last letter I mentioned that the Newcastle collieries had suddenly lowered the price to 10s. per ton. I find I was rather premature, as the dividend is so large again (in the other colonies especially) that the price is up to its original 14s., especially for the Wallend coal, as the gas companies must have this quality if possible.

R. D. A.

FLAGSTAFF LODE AND TECOMA MINES, UTAH.

SIR,—As promised in the Journal last week, I now proceed to answer in detail the communication of "M. E." I would premise my remarks by the quotation that "fools rush in where angels fear to tread," and such seems to have been the case with "M. E." He fearlessly launches out upon a sea of troubles, and by opposing seeks to end them, but only increases them by his unpractised and injudicious treatment. I pass over his observations about "clique," "unenviable notoriety," &c., as I am quite indifferent to such remarks.

In reference to the Varnes v. Billings suit he asks—does "Verax" not know that these tremendous damages amounted to less than 40l.? Why this, Mr. "M. E." though aiming at the opposite, actually confirms my statement in regard to the piracy complained of in the so-called suit against the Virginia. He admits the act of piracy, but endeavours to extenuate it by parading the small amount of damage done. Surely it must occur to "M. E." that the offence of piracy is not altered by the quality or quantity of the goods pirated, whether a fully equipped Cunard steamer or a Newfoundland fishing smack; neither is the offence of murder lessened by whether a duke or a dustman is slain.

The owners of the "Nabob" took time by the forelock, otherwise the Virginia might have had to pay them more than 40l., assuming that "M. E." correctly states the damages assessed. The Court did not assess the damages. This question was left to a jury to decide. But how does the amount of these damages interest the public as regards Flagstaff lode? Why, in no way whatever, beyond proving to them that the Nabob location covers the north-western portion of the Flagstaff lode, that an injunction was obtained to prevent any infringement by the Virginia owners, and that it is absolutely essential, in order to secure the whole of the property once known as the Flagstaff, that the Nabob ground should be obtained. I certainly should be very pleased to know (*vide prospectus*) that the Nabob claim has been secured to the new Flagstaff Company, but I have carefully read the prospectus and I fail to discover any allusion whatever to the Nabob. Such a word does not appear; perhaps, as "M. E." says, my "eyes are picked out," he is able to see that which nobody else can in the published prospectus. An examination of the bearings as they appear upon the records are more convincing than any loose statement made by "M. E." and his congeners, so far as the course of the Flagstaff lode is concerned. It is quite clear to any practical reader that "M. E." is totally unacquainted with the district, and has supplied the want of field notes by drawing upon imagination for his bearings, and although the plans he speaks of are very pretty to look at, the colour admirable, and the draughtsman greatly to be envied, they are unfortunately incorrect, and any attempt to explain away such glaring inaccuracies will be wasted upon those practically acquainted with the facts.

The incendios in the concluding remark of "M. E." respecting the original report upon the Tecoma Silver Mines (not uncommon in writers using a pseudonym) I treat with the contempt that inaccurate conclusions deserve, but in the interest of the shareholders and general public I shall make a few remarks in reference to this report.

As regards the statements therein, showing that, taking the ground between given points to continue as rich and as extensive as where opened upon in intermediate places at the time of inspection, and allowing nine months for laying open the ground, it was estimated that there was then in sight so many tons of ore, worth so much per ton, according to the assays taken. I think it would have been perhaps more prudent on the part of the purchasers to wait and see how this ground opened up during the nine months to prevent paying a large sum of money for the chance of the ore holding out, as it appeared in these limited shallow workings "the miner cannot see beyond the point of his pick," and had I been in London at the time, and especially considering that my own personal friends were during my absence induced to invest some 60,000l. in consequence of the representations made to them, and seeing my name at the head of the report, I should have considered it my duty to have pointed out this practical feature to the directors, and have urged them to wait until the ground was opened up before parting with so large a sum, or to have paid an adequate price for the mine as then developed. Following the same principle, I now consider it my duty to suggest to the public that they should withhold their subscriptions to any new undertaking until all the properties which it is desirable to purchase are contracted for, the machinery thereof intact, and titles thoroughly investigated, questions which can readily be settled by mining agents experienced in the district and a barrister acquainted with American law. I repeat my remarks in reference to the reports made prior to 1,000,000l. worth of ore said to have been taken out. If advices were received in April last, as "M. E." states, why are they not published in the prospectus? No reports of mining experts have, so far as I know, been lately made public respecting the mine, and I think it would have been more complimentary to the intelligence of those asked to subscribe if a recent report had been laid before them. As to the allusion to 5000 tons of ore mentioned by Prof. Vincent as being left standing in 1876, this would, at 825 per ton profit, represent 25,000l.; and I think, considering the industry which has always been displayed in extracting and selling ore from the Flagstaff lode, it is hardly to be supposed that 1 ton of this particular ore is now to be found standing. I make these remarks with no view of discouraging parties from subscribing to the Flagstaff venture. I believe the lode will yield in the future, with proper management, as largely as it has done in the past. The ground north-west of the old shaft is a splendid piece of settled mining ground, and will, doubtless, with the expenditure of working capital and proper development, produce great riches. This ground has been located partly by the Nabob Company, and without it the portion of the lode formerly known as Flagstaff property is limited to the holdings south-east of discovery shaft.

As to the Tecoma Mines, which "M. E." alludes to with a dash, this, and calls "an unfortunate fiasco," their development was strangled at a very early period. During the few weeks that the furnaces were in operation, before the management was taken out of our hands, some \$15,000 worth of bullion was produced, and since then I am informed that many thousands of pounds sterling worth of ore have been shipped away and sold by different parties who obtained control of the property, and now that the company has been fairly (or rather unfairly) "frozen out" the mines will probably be "jumped" by others and properly developed. That ore of great richness exists in these mines I think no one can venture to deny. When the late Capt. Forbes (a perfectly independent authority) at the time of his visit took samples and had them assayed at Virginia City results as high as \$3000 and upwards of silver per ton were obtained, although the ore of this grade was present but in very small quantities, so far as the explorations then extended. The discoveries at Leadville, Colorado, presented nearly similar appearances to those at Tecoma, as regards the heavy deposits of iron overcapping and lying the great masses of lead ore containing silver and gold. So

discouraged were the locators at the commencement that the New Discovery Mine was sold for a few hundred dollars whilst it was being sunk in the iron zone; directly they sunk through this mass the lead ore came in, and the mine has since returned millions of dollars, much to the chagrin of the former owners. Mr. H. B. Bearce, resident engineer of the Bald Mountain Mining Company, of Colorado, writing Feb. 16, says:—

"This body of iron and mineral is but a repetition of the history of every mine of importance on Fryer Hill; in the New Discovery Mine just such a body of iron separates the ore body found by Fryer in the Discovery shaft, and the great Bonanza found by me in the same mine a year ago last October; it was working in this class of iron that discouraged him and caused him to sell out for a trifle when within 10 ft. of the great find that has since produced millions of money."

These Leadville deposits are nearly horizontal, assimilating to the Ulvestone hematite iron ore deposits, and are known as flat, or "blanket" lodes; their extent in depth is, therefore, very limited, and new legislation will be necessary to provide for the location of such properties, as serious questions of title are likely to arise under the existing mining laws in reference to following the lode (the apex of which is within patented lines) throughout all its dips, spurs, angles, and variations, although it may enter the land adjoining. None of these difficulties exist in the Tecoma district of the Goshute Mountains, and I believe Tecoma will be a great mining camp when Leadville has been forgotten; the lodes have been well located and patented, and the utmost protection in regard to title is afforded by these patents and locations, and it is a matter of mystery to many that this company should have allowed their valuable property to lie fallow for so long. If it were some lead or copper mine in Wales or Cornwall, with only a shadow of the wealth of Tecoma, tens of thousands of pounds would have been eagerly subscribed for development. Can one imagine mines capable of producing from 60 to 100 tons of silver-lead ore per week remaining idle in Great Britain? The indifference of those interested is most difficult to account for, and it may probably arise from the difficulties of securing experienced and faithful management at so great a distance from home. The following is an extract from the letter of a gentleman who is well known upon the Pacific Coast, whose position, means of information, and integrity are beyond suspicion. This letter was dated June 14:—

"The Richmond, Eureka, and other mines in the Eureka district are proving very valuable properties, and I believe that when the Tecoma Mines are developed as thoroughly as those of the Eureka district satisfactory results will be attained."

Although I had but brief time to examine this district, I have now, and have had since I first saw it, a firm belief that it will become a great mining camp when the attention which it merits is paid to it, and I do not stand alone in these opinions.

In regard to the Leadville Colorado district, I see a communication from Denver in last week's Journal giving an account of this company, and the vast treasures which it has yielded, but my belief is that this district has had its day, and I would recommend British investors to be very careful ere embarking their capital in Leadville. It has nearly always been the fate of English investors in American mines to purchase at heavy prices properties from which large quantities of valuable ores have been extracted, and to meet with great disappointment as a result. If English investors were to go in boldly in the start, and help to develop newly-discovered districts with capital, and by purchasing good prospects at low figures, they would seldom have reason to regret it. Ten years ago I reported upon and strongly recommended the purchase of the Pelican and Dives Mine, near George Town, Colorado, and also of the Caribou Mine, Boulder County, Colorado, both of which were developed to a considerable extent, and could at that time have been purchased for a very moderate sum. They have since turned out many millions of dollars of rich ore, and made immense fortunes for their possessors. Heavy prices would now be asked for these mines after they have returned so largely. They are certainly true fissure veins in the granite formation, but how much better it would have been to have purchased them at moderate figures before so much of the ore was taken out than give extravagant prices for what remains. The railroad is now opening up Southern Colorado, and I believe this section of country will prove to be a second California in yield of gold. In a letter lately received I have been told of some fabulous "strikes"—with gold 50 ozs. to the ton—in the San Luis Park and San Juan districts. English mining speculators would do well to turn their attention to this new field, and get in at bed-rock prices, instead of paying heavy sums for partly exhausted mines.

I shall shortly be leaving England for the United States, and during my visit to the Far West will take an opportunity of paying a longer visit to the Tecoma and other mines in the Goshute range than I have hitherto had time at command to do, and I shall have very great pleasure in placing the results of my examination before your readers, who may be interested in the mining affairs of this section.

NICHOLAS M. MAXWELL.

52, Queen Victoria-street, London, July 6

FLAGSTAFF MINING COMPANY.

SIR,—The magic wand has been waved, and "Verax" has been metamorphosed into Mr. N. M. Maxwell. His letter would have been much more to the purpose if it had simplified the glaring discrepancies existing between our statements as recorded in the Journal of June 19 and 26. I shall, however, await with pleasure his promised explanations, and I can assure him that his reply shall receive the consideration it merits. I shall also refer to other letters which have appeared under the *nom de plume* of "Salt Lake," "Eye-Opener," "Vigilant," &c., which bear a most remarkably family resemblance, and will then append my name as requested. In the meantime Mr. Maxwell, although he is perfectly cognisant who your correspondent is, will kindly permit me to retain the initials of "M. E.," whatever meaning he may be pleased to attribute to them. In conclusion, I thank Mr. Maxwell (the embodiment of "Verax"—truth) for the equivocal compliment he renders, in his poetical quotation, to my honesty and devotion to the interests of the shareholders in the American mines with which he has been connected. I trust Mr. Maxwell will be as highly appreciated by them as is the schoolmaster abroad.

M. E.

THE ST. JOHN DEL REY AND THE BRAZILIAN GOLD MINES.

SIR,—Perusing the details of the St. John del Rey shareholders' meeting, as reported in last week's Journal, the testimony afforded by a shareholder as to the value of the Cuiba Mine is to me, as a shareholder in the Brazilian Gold Mines Company, highly encouraging. Mr. Richards, the manager of the Santa Barbara Mines, recently informed us that our property is close to the Gongo Soco Mine, which was the richest gold mine in the world. Now I find that the St. John del Rey Cuiba Mine is from our property about eight miles in the opposite direction.

The Cuiba Mine is estimated to be worth 100,000l.; the Gongo Soco returned gold of the value of nearly 2,000,000l. sterling. Our mountain of jacotinga, we are told, is a continuation of the Gongo Soco range, and we have a series of rock mines similar to Cuiba. Seeing the results now being realised at P'tanguí—a jacotinga mine—with its 10s. shares selling at 700 per cent. premium, that we have rock mines that have yielded gold of the value of 150,000l., and that our capital is only 40,000l., surely we have reason to look forward to a career of unusual prosperity.

A SHAREHOLDER.

NOUVEAU MONDE MINING COMPANY

SIR,—The absence of any announcement on the part of the *gérant* of this company as to the completion of the capital necessary for the purchase of the Nuncupai Mines is naturally causing much perplexity in the minds of a large class interested in the success of the undertaking. Whether the executive acted wisely in limiting the period for applications to three days may fairly be doubted. Sociétés en Commandite, however safe in their constitution and ample in their protection, labour under the disadvantage of being very imperfectly understood by the general body of English investors. With so short an interval, therefore, for decision it is scarcely to be wondered at that there should have been a hesitation to subscribe, as no statement was submitted to the meeting showing the financial position of

the company. It was this circumstance which, no doubt, alarmed many who otherwise would have come forward to contribute. It is possible that the capital has been already raised outside the previously existing body of shareholders. If so, it has surely been a mistake on the part of the executive not to have made a public announcement of the fact, which would give increased value to the shares, depressed as they are by the uncertainty of this company's situation. To restore public confidence is a matter of vast importance, and it is to be hoped that the parties at the helm of affairs will so far realise the exigencies of the case by avoiding, upright as their intentions unquestionably are, the possibility of any reflection on their judgment for an undue reticence at so critical a stage in the company's history.—July 6. SCRUTATOR.

CANADIAN MINING NOTES.

SIR,—This continent has been excused at least from the line of 45° north latitude to the Gulf of Mexico by the Chicago Convention, and the steps that are now taking to elect a President by the Republican party. It must be difficult for the average Englishman to understand the difference between the two great parties that contend for supremacy in the United States of America, while Republicans and Democrats appear to him almost identical. Yet it is only an identity in the words, for the principles of the two parties are very opposite. Twenty-five years ago, when the Republican party rose to power on the abolition of slavery question, at the same time that this was a prominent feature in their platform, the real basis was protection to home industries.

The expense of the war necessitated taxation, which was a means of plunging into the hands of the manufacturers. A heavy tariff became a necessity, and the American farmer was compelled to submit to a great rise in the price of necessities, until by competition the American manufacturer was able to sell nearly as cheaply as his foreign rival. Now, since the war is over, and the crisis of 1873 passed, the Democrats clamoring for free trade are beginning to make headway, and the Republican party have been so long in power that it is exceedingly doubtful whether the discordant elements of the party can be brought to act in harmony; and even if that should be the case, whether the people will stand by them at the polls. The Grant "boom" rose and fell, and rose again almost triumphant, but the action of Conkling disgusted many of the delegates, and the result as telegraphed last night was that Garfield was nominated as the candidate for President of the United States. The next move will be the action of their opponents, the Democrats; and if at their convention they nominate a good man they will probably carry the Southern States, the Pacific States, Pennsylvania, and New York. The people of the United States are getting tired of their high tariff, and many of the landowners and farmers think that it is "paying too dear for their whistle," as Benjamin Franklin has it. With an overflowing treasury and plenty of money they do not see why they should support the manufacturer. There is a cry beginning to arise through the land that the manufacturer has been supported enough, and that he is now fully competent to take care of himself. Besides, the attitude of England makes the sons of England in America ashamed of themselves. England opens her markets to the American manufacturer, while the American markets are closed against the English manufacturer. "It is not fair play." The Republicans "are oppressing the farmer for the advantage of the manufacturer." "We have protected the manufacturer enough." These and similar statements are becoming prevalent, and if the Democrats manage the business well it will be the closest election that has been held, and may result in victory for the Democratic party. While the people of Canada take no part in these elections it is impossible, living in such proximity to the contest, not to be interested; and, what may appear the greatest anomaly, many of the Conservatives who advocate the national policy in Canada would rejoice at the advent of the Democrats. The reason is that the national policy was a policy of self defence. Without a protective tariff we could not contend with the manufacturer of the United States. He was protected in his own country, and invaded our markets, destroying the little market which Canada possessed. If, however, the Democrats were to be called by the voice of the people to office, a free trade policy would probably be inaugurated, and then our national policy would be altered to suit the different order of things.

MINING IN CENTRAL CANADA.

Central Canada may be said to be that portion of the country from Cornwall, on the St. Lawrence, to Cobourg or Port Hope, on Lake Ontario (a distance of about 200 miles), running directly north between those points, and embracing a large area of country in the provinces of Ontario and Quebec. Within their area are the cities of Ottawa and Kingston, with the towns of Port Hope, Cobourg, Belleville, Brockville, Pembroke, and Cornwall. The most northern town is Pembroke, on the Ottawa river. This section of Ontario is certainly the best mining section, and the mines are almost entirely undeveloped, while the advantages of proximity to civilisation is present. The chief mines at present which have engaged attention are the plumbago, at Buckingham, on the Rivière du Lièvre in Quebec; the iron mines on the Gatineau, belonging to Hancock and Co.; and the apatite mines. All these are not very far from Ottawa. Then as you go west in the townships of Loughborough, the lead mines of the Frontenac Lead Company; the iron mines in the township of Bedford in Barrie, a fine deposit of silver and lead, with silver to the amount of \$50 a ton; and in Madoc and Marmora gold in arsenical pyrites. Further west, in the township of Snowden, there is an immense deposit of iron ore; and in Galway and Limerick lead is found. North of the Ottawa river there are indications of good silver ore, and in the Coulonge river it is said to have been found.

In the United States companies have been formed for the development of their resources, and there is no reason why the mining men of England should not turn their attention to the development of Central Canada, and form a company for that purpose.

The object I suggest is strictly a Development Company, and the method as follows. Let a company be formed, say of 20,000l. sterling, with only 10s. in 1l. paid up. Then this company would obtain land on which there are minerals, spend enough to develop them, and put them in the market and sell them. That would be its business. If the mines turned out good they would have no trouble in selling them when they were developed. If after development they did not turn out well, then they would not put them in the market. When you consider the price of mineral land in Central Canada (Crown lands \$1 an acre, and private lands not much higher) the price of developing, and the price of a good mine, no one who is acquainted with the business of mining can doubt but that there is an immense profit. With such a plethora of capital as there is in England, seeking investment all over the world, Canada only ten days off, communication by telegraph at the price of 6d. a word, a good climate, where workmen are healthy, it is a perfect wonder that a Canadian Development Company has not been formed in England.—Brockville, June 6. BOURNOSITE.

CANADIAN MINING NOTES.

SIR,—My last letter spoke of the advantages to be derived from the formation of a Canadian Development Company, and the more I think about the enterprise the more it appears likely to succeed. There is no reason why such a company should not enter into the buying of land (agricultural as well as mineral), for if the price is very low the development makes the land valuable; one has only to calculate the price of the development, and the value of the land when developed, to add up the profits. Under our Drainage Act money can always be obtained from the Government to help the development of agricultural lands by drainage, although the Ontario Government has not turned its attention to the development of mineral lands.

PROSPECTING ON THE OTTAWA RIVER.

A party of prospectors have been up the Ottawa some 150 or 200 miles above Pembroke to Lake Tunis-camanque, for the purpose of discovering some rich silver and gold and other mines that are supposed to exist there. Whether they have been successful I have not yet heard, but hope they may be, as the country is likely to be much improved in case they are. One successful venture in mining in Canada will turn the eyes of capitalists towards the country, and expeditions after expedition will be sent out. Lake Tunis-camanque

is a long lake, being in fact the widening of the Ottawa river, situated between 47° and 48° of north latitude, and 79° and 80° longitude west from Greenwich. It is pear shaped, and full of islands. The water is very deep, and the geological formation one that opens a wide field for investigation. I do not know whether the Geological Society of England have turned their attention to Canada as a field, but if they have not they are like people who have never read the works of Charles Dickens, and have a great and interesting study before them. Lake Tunis-camanque is about 90 miles south of Lake Abittibi, which is much larger. The country between those two lakes will certainly reward a geologist who has a delight in the study, whilst the scenery, fishing, and shooting are not to be despised. Where is the old adventure of young Englishmen? Their forefathers were not so welded to wealth, trade, and luxury that, with very many less advantages, they could not enter on a field of adventure.

The mines on the north shore of Lake Superior, the rocks on that line seem to be of the same formation to the north of Lake Neepigon, past Lake Abittibi, down the north side of the Ottawa, across to New Brunswick and Nova Scotia. They almost all abound with minerals.

While, then, the people of the United States are discovering a Leadville, and building up the State of Colorado, let the English and Canadians form an Association, and discover the riches which lie hid in the heart of Central Canada. BOURNOSTITE.

Brockville, June 14.

THE CAPE COPPER COMPANY.

SIR,—I see that it was stated at the meeting of this company, as reported in the *Mining Journal*, that it is contemplated to increase the raisings for 1880 up to 16,000 tons, against 12,165 tons in 1879. This is a very important feature as bearing on future dividends, seeing that an extra output of 4000 tons of 30 per cent. represents 1200 tons of copper at 60¢ per ton—72,000¢, one-third of which, or 24,000¢, is net profit, which will go to swell the future dividends. But more than this, it is the best indication of what the directors think of the new discoveries, for they are assuredly not the men to kill or exhaust the goose that lays such golden eggs. That the directors should have decided on this increased rate of production quite disposes of the report so industriously circulated that the "approaching exhaustion" of the mines was the reason why the directors thought it prudent to place such large sums to the sinking fund. Cornwall has produced copper for many centuries, and so will this region, tapped, as it were, but yesterday. To me it seems they were in a dilemma. They had either to do that or declare a dividend of 2¢. They chose the first course, not wishing to elate their shareholders too much, and then to have to revert to it again.—July 7. W. B.

CAPE COPPER MINING COMPANY.

SIR,—The suggestion made by "W. W." in last week's *Journal* that this company should proceed in the distribution of profits on a better plan than that which resulted just now in the rather large sum of 27,000¢ being dealt with in favour of reserve and sinking funds, would appear to be a plausible one, for shareholders would like to see their interest cared for by a more systematic distribution, instead of what looks like starts and fits.

The company, it has been intimated, is entering on a new mode of dealing with its raw products, and the process of smelting the ores and disposing of the refined metal may probably require additional ready means. The balance-sheet of the company explains the desire of the managers to add so largely to the various reserve funds. There is no working capital beyond the portion of profits which each year has been retained and carried to the sinking funds. With the original capital of 140,000¢, and a credit of 86,000¢, together 226,000¢. Assets have been acquired, amounting to 412,000¢ (including tramway 169,000¢), which sum, by the operation of the various sinking funds of together 161,000¢, has been reduced to about 251,000¢, as against the said 226,000¢. It should cause, therefore, no surprise if the sinking funds were to receive still further additions, but they should be regular and gradual when the profit admits of it. What is designated as "reserve fund" it must be borne in mind is so on paper only, for it is not specially invested, as the Chairman explained a year or two ago, and forms, therefore, part of the working capital.

The remarks about the ore deposits opened up in sight of 40,000 tons, as described in the report, page 25, representing, as estimated by "W. W." 720,000¢, may be apt to lead to some incorrect inferences. Many of these deposits, as explained by the managers last year, may not be available for a long time to come, forming pillars, supports, &c., required to remain *in situ* for the sake of security of underground constructions.—July 8. G. P.

THE WORLD'S SUPPLY OF TIN, WITH REFERENCE TO THE UNITED STATES.

SIR,—The readiness with which you allowed my letter of March 20 on the above subject to appear in your crowded columns encourages me to address you once more after an interval of just three months. Since then the whole metal market on both sides of the Atlantic has passed through a serious crisis. The iron market on your side broke down in the face of enormous shipments to the United States, and though our holders and importers showed for a time a bold front they were ultimately compelled to submit to the inevitable—to lower prices, and to accept the situation.

Nearly every kind of metal thereupon became the sport of "bear" sellers, through so-called sympathy with the depression in the iron trade, in utter disregard of its true position. Most conspicuous, however, was the great depreciation in the price of tin, which continued to be hammered down on your side from 100¢ per ton on Feb. 1 to 68¢, early in the present month, in the face of falling stocks and reduced supplies from the producing countries. Though our market most reluctantly followed yours in its downward course our dealers were compelled to reduce their prices, in order to protect themselves against indirect importations. On the other hand, our importing merchants stood their ground quietly, warehousing their consignments, and withdrawing from the market, under the conviction that they understood the real position of the article, feeling satisfied that increasing consumption both here and in Europe would sooner or later cause a reaction in the opinions of those who had been led away to believe every floating rumour of what would happen here—that we would swamp you with a re-exportation of 4000 to 5000 tons of our surplus. The actual shipment hence to Holland of 3000 slabs Billiton appeared for a time to remove all doubt upon this subject. The simple fact, however, is this shipment originally was an indirect importation, lying here in bond, liable to 10 per cent. *ad valorem* duty, the owners replacing the same by the purchase of double the quantity of free tin out of the hands of weak holders. However, it served its purpose as an advertisement, and brought about the revolution in the trade which we have been witnessing during the last 10 days. Orders to buy here Straits, Australian, and Billiton came pouring in from Europe, mainly from London—thus proving to our holders that your operators were at last ready to confess that they had hesitated too long in replenishing your reduced stocks, and dared not go to the East to show their hands there. Their want of success here appears to have forced them to send their orders to Singapore and Penang, and enter into a lively competition with buyers from this side and from China at a period of the year when it is invariably most difficult to find adequate supplies—hence the sudden improvement within a few days of fully 20 per cent. in all the markets.

We may now expect to see even the most sceptical on your side turn round and confess that the centre of gravity of the tin trade is for the time being to be found here, confirming what one of your most experienced men in the trade wrote six weeks ago—that the tin trade of the world is at present controlled by the United States. Considering that indirectly, in the shape of tin-plates, we annually absorb about 8000 tons of fine tin, and fully 13,000 tons more of block of all kinds, it stands to reason that our operations in this article, the annual supply of which hardly exceeds 37,000 tons, should be of paramount importance. But are we likely to get the supply of 37,000 tons for Europe and America anticipated in my letter of March 20?

From information since received, and judging from actual ship-

ments to date, Australia will this year not be able to provide more than 6000 tons, and from the Straits settlements they cannot spare us over 10,500 tons, after satisfying the growing demand for China, which is now rapidly recovering in prosperity in consequence of their fine harvests during the last two seasons.

In my estimate of supplies for the year 1880 I took the combined shipments of Australia, Singapore, and Penang at 19,000 tons; consequently, we find a further deficiency of 2500 tons, or a total (as shown in my original estimate of 6100 tons) of 8600 tons below the estimated consumption of the world. From this deficit, however, should be deducted the 1000 tons concealed stock returned to London warehouses from the Continent of Europe during last January and February, leaving thus on balance a deficiency of 7600 tons.

Now, as for the consumption on your side, I find that the combined deliveries from London and Holland for the first five months were 8763 tons as against 8218 tons at the same period last year, slightly below my estimated increase of 10 per cent. On the other hand, our consumption so far has considerably exceeded my original expectations. Thus our consumers took—

From Jan. 1 to April 1.....	Tons 3700
During April.....	1200
" May.....	1100
And I estimate the takings for June at.....	1200

Total for first six months.....Tons 7200

There is, moreover, every probability that we may do quite as well during the balance of the year; consequently, we shall most likely exceed my original estimate of consumption by over 2000 tons. Our mutual necessities must naturally cause a sharp competition with our English cousins in the markets of the East, of which I am afraid the Chinese miners will not be slow to take advantage; as a first instalment we have witnessed during the last ten days a rapid rise of nearly 25 per cent. in Singapore and Penang, and I should not at all be surprised to see such violent movements frequently repeated before the close of this year.—*New York, June 24.* CONSTANT READER.

ATLANTIC AND GREAT WESTERN RAILWAY.

SIR,—Now that the line has been relaid the First Mortgage at the present price of 67½ to 68½ would seem worth attention. There are good traffics to look forward to, and this will affect not only the gross earnings, but the net earnings. The receipts for the week ending June 27 were \$95,000, against \$80,000 of last year; this is equal to an increase of over 18 per cent. Now that the line is in uniformity with other railroads *bona fide* holders of the First Mortgage Bonds may rest assured that the next earnings will be satisfactory enough, so as to yield them a certain income. For many years past there has not been a better chance for intending purchasers of railroad bonds to increase their capital *bona fide* 50 per cent. within the next twelve months as there is in the certain rise of the First Mortgage Bonds. *London, July 8.* B. E.

DOLCOATH MINE.

SIR,—Great credit is due to Mr. Heard, of the West Briton, Truro, for his persistent endeavours to bring mining committees and pursers within the limits of propriety. He is the holder, I believe, of shares in numerous mines, amongst the rest West Basset, South Frances, Dolcoath, Tincroft, and Carn Brea. Whenever a meeting is held of the adventurers in any mine in which he holds any interest, and he finds any irregular proceedings, such as cooking the accounts, he rises to express his disapprobation of them, and his efforts in the right direction have in some measure been successful. You will remember how at West Basset, Tincroft, Carn Brea, and Dolcoath he found out by pressure that heavy balances were due to bankers, unknown to the companies, and how in those mines he induced by exposure the committees to set the accounts in a proper light—*i.e.*, to stop "cooking" of them. I am aware that by so doing he gave umbrage to the cooks, but now that matters are straight, in most cases, the offence has ceased.

At Dolcoath meeting, a few days ago, Mr. Heard found that it was intended to declare a dividend of 1¢ per share, partly from a loan from the bankers, and he expressed his disapproval of the practice of paying dividends out of borrowed money; a very reprehensible thing it is, and why the committee condescend to do so I do not understand. Of course, he could not overrule the decision of the committee, so the dividend was determined on. It may be that some of the shareholders wanted money, and therefore borrowed through the Dolcoath committee. I suppose that I knew mining before any shareholder in Dolcoath, and in my early years such a course was never adopted, and it is quite a novelty in mining. If there was tin in stock, and money was wanted, the stock should be reduced to raise it. Upon the long run nothing is gained by stocking tin, and, if I mistake not, the Dolcoath Company lost two or three years ago by withholding their tin from the market.

I have no personal interest in the matter, but as an outside observer I hereby express my disapproval of the payment of dividends out of borrowed money. It is almost as bad as paying dividends out of subscribed capital. I question whether Captain Thomas approves of dividing borrowed money. The company should divide their own money only, and not that of their bankers. *July 6.* OBSERVER.

WHEAL CREBOR.

SIR,—Noticing several letters on, and reference by, brokers and others to the above mine in a recent issue of your valuable *Journal*, and knowing your desire to give your readers all the reliable information obtainable on these matters, so that they shall not be misled, I venture to send you a few lines for insertion in your next issue. And first, let me say that, not owning a share in the concern, I cannot be said to have any personal motive to serve. My sole desire is to correct some erroneous statements which have recently appeared in reference to this mine generally, and the "new lode" in particular.

At the meeting everything was gilded with roseate hues. A dividend has great power to charm. Nevertheless, 2s. 6d. per share four-monthly would only be 10 per cent. per annum on a 4¢ share; and on the present price (6¢ per share) would only be 6½ per cent. per annum, scarcely reckoned sufficient for mining investments, especially where there is no guarantee of its lasting even another year. A good deal has been said about the lode in the 120. Now, it is well known, or should be so known, by all who have inspected the mine that the winze sunk from the 108, and from which the stopes in the 120 are started, was sunk at the junction of the new lode, or south lode, as it is variously called, with the north branch, or that on which the 108 main level was driven, and that this winze was sunk on the best part of the lode yet seen. The 120 east was started from this winze in a lode reported at 70¢, per fathom. After driving some 5 to 7 fms. it has fallen off to 20¢ per fathom, as might well have been expected, seeing that the level above this, the 108, has been driven for the last six or eight months in totally unproductive ground. The 120 west, which started with a lode reported at 70¢, to 80¢ per fathom, has been driven about a dozen fathoms on the south or footwall part of the lode, which part having become absolutely valueless the men were put to strip down the north or hanging-wall part, and are now driving on this part, the end being valued at 15¢ per fathom, plainly showing that the bunch of ore is rapidly falling both east and west. I can also state that in the winze 5 to 6 fathoms above the 120 the lode is not more than 5 ft. wide. In the 108 the main drive was on the north or unproductive part of the lode, and the so-called new lode is, in reality, the main part of the lode, and anyone who may choose to do so can see for himself where the split comes, which is some 3 to 4 fms. west of the first cross-cut put out to intersect the south part. If this be not so, let me ask why they do not drive west on this lode, or why do they not put out cross-cuts further west if they believe this to be a new lode?

Then the statement about the "poor floor of ground" in the winze recently started in the bottom of the 108, on the "new lode," is also calculated to mislead. This is not the only winze sunk on the lode, one having been started some 20 fms. to the west of the present one—just by the first cross-cut—and after sinking it some 3 to 4 fms. was abandoned, the lode having pitched out, conclusively showing that the ore does not hold down. The 108 "new lode" has been

driven more than half the distance there is to drive on this lode reach where it intersects the part driven on; or, in other words, until they will hole out into the main level.

For the distance driven the lode has varied in value from 15¢, per fathom. The ground in the back of this level, some 20 fms. in length, is being worked in two stopes, and although there may be spots in this distance of the value reported, I defy anyone to say that the average of this ground is anything near the value it is reported at. The cross-cut recommended to be put out at the 120, another illusion. The folly of spending so much money on the lode recently put out at this level was fully shown by the results. The lode less it answered the purpose sought—to report on occasionally having "cut a branch of spar," or "letting out a little water," so excite in the unwary the hope that the "new lode" might be the fact is plain that both branches are together at the 72 and 120. Add to these things that at least a year and a half must elapse before the new shaft will be sinking below the 120, and unless further discoveries of ore are made in the eastern part of the mine—of which there are at present no indications—all the available ore will be taken away before that time; and I am bold to state that these shares are at present price 100 per cent. higher than anything in the mine will warrant their being. I need not mention the great inconvenience and expense of getting to surface the ore lode at the 120, where, in consequence of there being no trip-plat, a pound of stuff has to be shovelled first out of the tramcar and again into the skips, nor of the antiquated method of dressing the ore these being things that a sufficient outlay will remedy.

If in what I have written I am wrong—except, may be, slightly in distances—I should be most happy to be put right, as my sole motive is that the public may know the exact position of this mine, and that mining generally may not be stigmatised in consequence of reckless speculation in mines without sufficient information. *Horrabridge, July 7.* THOS. TREMARTIN.

WHEAL CREBOR, AND DEVON CONSOLS.

SIR,—It is far from my wish to do, say, or write anything in reference to Wheal Crebor tending to disparage it in any manner, and still less to depreciate it in the style so well known amongst the "bearing" fraternity; but in noticing the position it has attained, and the advance which has taken place in the price of the shares, has occurred to me, as a shareholder in Devon Consols, that Wheal Crebor shares have advanced beyond the price the consols warrants, or Devon Consols are being most unmercifully "beared" or very much underestimated—a conclusion which anyone comparing the two concerns (as to their production, prospects, dividends declared and being declared) will, I am sure, concur in. If we take the dividends as a basis upon which to calculate their respective merits, we find that while Wheal Crebor has distributed dividends to the amount of 6s. 3d. per share as the result of eight months' working, Devon Consols has paid 18s. per share from the profits of six months' production; and looking at the improving quality of the ore, and increased production, together with the points just now coming in in the latter mine, I think we may safely anticipate an increase in the dividends for the six months to come.

If the present price of Wheal Crebor may be taken as a standard by which to estimate the value of other mines, Devon Consols, then, assuredly, to be now selling at from 24¢, to 26¢, per share. Individually, I believe they are really worth that price at the present moment, considering the present condition and prospects of the company, and I have not a doubt that they will be at that price, or over, before this year terminates, as copper is surely, if slowly, advancing in price, and from what I have heard remarked by one or two astute old brokers, "copper will run up higher than it has yet been." As a shareholder in Devon Consols I confidently anticipate reaping a large profit in due course, and I only regret that a limited means prevent my increasing my interest while the price is so favourable. My interest in the good old mine is, however, sufficiently great as to induce me to take up my pen when occasion requires to support its claims to the public estimation, if not granted remembrance. It certainly deserves both. *July 6.* OBSERVER.

CORNISH MINING—THE GWENAP DISTRICT.

SIR,—In drawing attention to the unwrought ground around Carn Marth range of granite, it may not be out of place to remark the investing public that about 20 years ago the mines then working to the east were United Mines, selling at about 1000¢ per share, and the Great Consols, at 600¢ per share, to the west; Wheal Buller 500¢ per share, to the south; Tresavean, 550¢, and Trevisky, 500¢ per share. These were copper mines. There are large pieces of untried ground on the same lodes, requiring only a small outlay to open up mines of equal value. East Wheal Buller is now being developed by means of a cross-cut which will cut the Wheal Buller lode at a depth which several of the greatest mines of Gwynep commenced being ore producing, proving more and more productive in depth, and paying larger profits than any of the other districts in Cornwall. The probabilities are in favour of this mine proving to be a rich mine as will revive the brilliant era of Gwynep copper mining of former days, there being many old mines in the past which have profited hundreds of thousands of pounds; it is, moreover, accompanied by an elvan course of correspondingly crystalline character to the one in connection with the great body of ore in the adjoining mine, Wheal Buller, and of the one in Tresavean Mine. It is further being intersected by a well known important cross-cut, to which is not a little to be attributed the immense accumulations of copper ore met with throughout the district. Thousands of fathoms of unexplored ground within the limits of this sett, the opening of which will lead to the discovery of mineral wealth, and enrich those who invest the small capital required for its development. *St. Day, Scorier, Cornwall, July 8.* C. BAWDEN.

THE CHINA CLAY TRADE.

SIR,—In the absence of metallic mining in the district of Roch and the surrounding parishes the china-clay works supply the population with labour, whereby the labourers earn steady but low wages. The pay is 2s. 6d. per day. A few years ago it was only 2s. 3d., previously less than that, I think as low as 1s. 9d. per day. You will remember the strike a few years ago which these labourers made by which they lost several months' wages and gained nothing. The shopkeepers who supplied them with food during the strike were the greatest losers, for they have not been paid, and are not likely to be. There is one trait in the character of the day labourers which deserves commendation—they are generally well behaved and well in their department and habits. Many of them are also truly religious. They are not likely to commit themselves again to the folly of a strike—it is too costly a luxury. Painful experience has taught them a long-to-be-remembered lesson. "Experience is a dear school, but fools will learn in no other" is an old adage.

The clay works in Roche, St. Austell, St. Stephens, St. Mewan, Enoder, &c., are very numerous, and so are the proprietors thereof, of whom Messrs. Martin, Brothers, are probably the chief, because their works are numerous. The West of England Company also send to market a very large quantity of clay every month. You may judge of the extent of their output when I inform you that they pay Capt. Fortescue, the landowner, about 7000¢ per annum for the clay. The minimum rent payable to him is 5000¢ per annum. The dues on clay vary from 3s. to 4s. per ton, which is about 10 per cent. of the gross value, a very high charge certainly where the landowners incur no risk, but the workers all of it. However, there is not in clay works the risk which is attached to metallic mining, because before a clay pit is opened trials pits are sunk to ascertain the existence and quality of the clay. As a rule, I think the greatest gainers are the lessors, and as a rule also the workers profit by the works, many persons having made good fortunes by the pursuit.

Capt. David Cook, of Roche, is a joint proprietor and manager of several clayworks, some of which I know and will name. Robert Gombarrow, a very good work; Littlejohn, another good claywork; North Bonny, another; Savath, in Luxulyan, is an iron, tin, and copper sett, recently taken in hand by him, and likely to be very profitable.

Mellengoose Clayworks, in St. Enoder, also recently taken in and by him, contain first-class clay. A large water-wheel to drain the pit is about to be erected, and a dry storehouse, tanks, &c., are in readiness for operations. Contiguous to Mellengoose is another valuable clay set in virgin ground, about to be opened, in Burthorpe estate. The tests have proved the quality of the clay to be good, and the bed of it to be very extensive—at least 10 or 15 acres. It can be worked for a few months before the requirement of any pumping machinery besides the water-wheel, which is to serve both as a dry railway siding and tanks are about to be erected in Falley, which is the name of the works. Lord Falmouth is the owner of the land in Mellengoose and Burthorpe. Near Mellengoose Capt. Cook has an iron mine, in Retew estate, which produces an ore of good quality. Part of it was formerly worked by the late Capt. J. Davies, of St. Agnes, under the name of Wheal Edith. We have heard a great deal about the badness of the times. I hope the present aspect of things that "there is a good time coming."—*Truth*, July 7. R. SYMONS.

BLAEN CAELAN LEAD MINES, CARDIGANSHIRE.

SIR,—I looked carefully through last week's Journal expecting to find an account of the general meeting of this company, which I attended last week, and was disappointed not to find it reported. It seems like "hiding their candle under a bushel" for the directors to omit to send for publication the proceedings of a meeting at which every shareholder seemed satisfied and pleased, and every resolution was carried unanimously. The only mention of Blaen Caelan that I observed in your Journal, other than the usual weekly report, was in the last paragraph of a letter from Mr. Chas. Williams, which, curiously enough, corroborates the statement made by the manager at the above-mentioned meeting, that "a rich course of lead ore" had been found within the limits of the Blaen Caelan set on the lode which we have recently passed through in the cross-cut we are driving in the eastern portion of that mine in order to intersect the Esgair-hir lode, and the fact that we have cut a parallel lode on our road thither seems also to corroborate Mr. C. Williams's impression (mentioned in an earlier portion of his letter) that there are two Esgair-hir lodes. This point, however, will soon be cleared up by the proposed drivings on the course of these lodes in the Blaen Caelan set, and as Mr. Williams gives his address I shall, when next I am in that part of the world, avail myself of his kind offer to point out the spot where he, when manager at Esgair-hir—drove their workings into the rich course of ore in the Blaen Caelan set, the boundaries of which remain the same as they then were, except that under the present proprietary they have recently been considerably extended so as to include a valuable addition in the West Blaen Caelan Mine. I cannot help thinking that this property, with its extremely moderate capital (being far less than the actual money expended on the mines and extensive plant), its already proved results, and its splendid prospects, has been overlooked by the investors in mines, or the shares would hold a much higher position in the market, and probably enough this is a good deal to be accounted for by the palpable indifference displayed by the directors as to making its merits more generally known, an indifference which is by no means participated in by—*July 5.* A SHAREHOLDER.

Report of the meeting will be found in another column of this day's Journal.

BWLCH UNITED, CARDIGANSHIRE.

SIR,—The recommendation of a "Recent Shareholder" to his co-partners to personally visit the above property is sound, since more can be learned in a short time than can be conveyed even with the power of the pen, and a ready perception formed of the works in progress, the objects aimed at, and the means employed to carry them into force. Three months ago I had occasion to visit Cardiganshire; then as now I passed some hours on this mine—having, in fact, just returned—and knowing well the commercial standing of your correspondent, I must add I should have been pleased to have seen his address attached thereto, although not a London one. However, I freely endorse all he states as to future prospects, and at the same time think it would not be out of place to briefly enumerate the more important works done since my last journey. The 40 ft. water-wheel for crushing purposes has been erected with new launders; crusher entirely renovated with new rollers, raff-wheel, &c.; also connections and fittings for driving the patent six compartment engine, besides other connections to the round buddles, &c.; new line of rods, pulleys, and stands from the large pumping-wheel, about 130 fms., to the 24 in. revolving plunger for working the said wheel, with large cistern to regulate and cause a uniform flow of water; water-course two miles in length made for supplying the dressing-floors; and from Ritchie's shaft a line of railway has been relaid with timber and rails to pass; also a line of railway to the crushing-floors. There is also a lot of other work appertaining thereto and not enumerated. In a few days the mine will be thoroughly equipped for all purposes. The main shaft in the brief interval has been sunk fully 7 fms., and it is satisfactory to find the stratum becoming more marked and congenial for the deep ore deposits, with a strong vugly lode, giving out a large feed of water, as also the stopes improving in their yield of silver-lead ore. *Traveller.*

London, July 8.

CARDIGANSHIRE MINES.

SIR,—Since my last I thought it best to go up and see the Camdwr Mawr or Great Camdwr Mine before alluding to it; I, therefore, went up yesterday. This mine was first worked within my own recollection about 40 years ago by the same company who were working Esgair-hir, Allt-y-Crib, and Havan Mines. They did not do much work, but they drove a cross-cut through a mass of mudstone over 4 ft. wide, but never sunk under it. Mr. Henry Francis next worked it under a company, but after sinking about 30 fms. and finding a splendid course of copper, they were compelled to abandon it in consequence of the great quantity of water and want of funds to erect new pumping machinery. Since that time nothing has been done in the old mine, which has now been idle nearly a quarter of a century. During that time, however, several trial pits and levels have been made; and the latest, at the top of the mountain, has proved the lode to be upwards of 100 ft. wide. When I saw this place yesterday I was strongly reminded of the great open cutting at Parys Mountain and Mona Mines, which it greatly resembles in many particulars. The workings here are only about 8 fms. deep, having been stopped by a great influx of water, which burst up at the bottom and prevented any further sinking. Other surface workings have proved the existence of two lodes running nearly parallel to the lodes in the old mine, and, in my opinion, all these lodes are coming together in the top of the mountain, and that were the red gossan driven under, a large deposit of mineral will be met with. No great capital is necessary to make the mine one of the most remunerative in Cardiganshire, dressing-floors, water lauts, &c., being all ready. The geological formation of the east ground is highly congenial to copper, the great lode running in a channel between killas on the north and Plynlimon grits on the south. In the western or old mine, however, the lodes are entirely in killas, and appear to become lead-producing. These lodes pass through Bwlch Styllen, Vaughan, and other mines to Bronfloyd, where they again come together, forming a very wide and productive lode.

To the north-west of this property we come to the Havan and Rendlewh Mines, which appear to be very ancient, and from workings entirely above adit over a million pounds sterling worth of lead and copper has been sold. About 35 years ago I drove a cross-cut south, and then sunk a few fathoms on exactly the same red gossan as is to be seen at Great Camdwr, under which the lode became hard, and we had a splendid rib of copper ore over 9 in. solid. All the courses of ore are dipping west with the hill, and were an engine-shaft sunk on the flat, and driven from east and west, a great mine would be laid open, beyond all doubt; but as for the upper part of the mine, it has been entirely worked away by means of adits. The adjoining set, to the west, has been worked in a limited way on the same lode, but they have not got the whole of the lode to their level; there is, however, a very nice rib of ore to be seen about 3 in. wide.

We next come to the Ty Newydd and Moelglomen Mines, on which there are four known lodes, the principal of which is the same as

that worked at Mynydd Gorrddu, in some places in this mine 10 fms. wide, but on which very little trial has as yet been made. There is no doubt that this is the Havan lode, and that the other three lodes fall in and form a junction with it. In going west on these sets lead has been found in various places on these three lodes, varying in value from 15 to 30 cwt. per fathom; in fact, about 80 tons of lead have been sold, for 16l. to 17l. per ton. The mine is only 25 fms. from surface at the deepest point, and there is no doubt that the present rich bunches of lead of which the lodes are composed are the upshoots of a very large contracted body of lead that will be found at but little depth below the present workings, all the mineralogical characteristics of the lodes being greatly in favour of such an opinion. The adjoining mines to the west are Cefn Gwyn and Mynydd Gorrddu, which I will reserve for my next.

Dale Cottage, Taliesin, July 8.

CHARLES WILLIAMS, M.E.

MINING IN NORTH WALES.

SIR,—Relevant to Mr. J. Humphrey's interesting letter in last week's Journal, there is a question of some interest to mining adventurers which deserves the attention of geologists and miners. I allude to the probability of the lead veins of the calcareous limestone of the Principality prolonging into the subjacent slate rocks below and becoming productive therein. I do not think a precedent can be found in North Wales of a productive metalliferous lode in the Upper Silurian rocks, which, no doubt, are those found in the depths of the Minera Mine, described by your correspondent as clay-slate. May be Pennant Mine, near St. Asaph, is an exception. I have no doubt your able North Wales Correspondent can enlighten us on this point. In Montgomeryshire and Cardiganshire the metalliferous lodes are confined to the Llandeilo beds of the Lower Silurian strata, and the characteristics of the Upper Silurian rocks are thus faithfully described by a well-known geologist—"The Upper Silurian rocks of North Wales are, as a rule, very worthless and profitless to the mason, the miner, and, indeed, very much so to the agriculturist, and have only been so far affected by the slaty cleavage as to leave them in a disjointed, incoherent state of mudstone."

I hope some experienced geologist or miner will favour us with his opinion on this point, and say whether the rocks of the Upper Silurian strata deserve condemnation in a mining point of view, or whether, as Mr. Humphreys suggests, they are deserving of further trial when met with under similar circumstances as those described by him at Minera.—*Montgomeryshire*, July 7. LEAD MINER.

COMBAMARTIN SILVER-LEAD DISTRICT.

SIR,—I have just come across a letter in the Journal referring to the prospects of the Combamartin district. Having recently paid a visit to the neighbourhood I can fully endorse the remarks therein contained, and should not be surprised at any moment to hear of an important discovery being made here. I have carefully inspected both the east and west sides of the valley. It is true that no very large quantities of silver-lead have actually been sent to the market yet; but there are scores of mines which take years of careful working before that reward comes, which ultimately well repays the adventurer for his patience. The prospects of the old Combamartin Mine are all that could be wished, and it is under able management. Were I asked which piece of ground I should recommend for a future mine I should without the slightest hesitation select the property belonging to Mr. John Boyle, of this parish. There are several well-defined lodes running through the entire estate, and excellent specimens of silver-lead ore have been broken from the backs of the lodes. There will surely be a mine spring up there sooner or later, and in my humble opinion it will be a really good one. *Torquay*, July 8. INSPECTOR.

THE LONDON AND PARIS COAL SUPPLY.

VIA BOSTON DEEPS—THE GRAND FUTURE OF THE GREAT NORTHERN RAILWAY COMPANY.

SIR,—The profound interest you invariably evince in all that affects coal mining—for instance, your last issue stating "The best Durham house coal, Hettons, &c., are only selling, ex steamer, at 14s. 6d. per ton, for which the London merchants charge 22s. per ton to consumers; the coalowner selling his produce at a loss, whilst the merchants are clearing a good profit"—urges me to address you in alleviation of the deplorable state of this most important industry. On May 28 last the top price of the coal market was still lower, having been reduced to 14s. per ton—the lowest quotation ever known on the market. Haswell, Hetton and South Hetton, 14s.; Tees, 13s. 9d.; Lambton, 13s. 6d.; Hetton Lyons, 13s.; from which is to be deducted—

For allowance to coal merchants from derrick.....	1s. 0d.
Discount, payment cash after one month from loading	
of barges, 3 per cent. (say) off 13s.	0 3
Storage, 1s. per 21 tons	0 0½
Coal factor's commission	0 4
City dues	1 1
Interest, 40 days at 5 per cent.	0 9
Minimum freight (the decennial average, 5s. 6d.)	4 0

Total

Further, stamps and postages on cargo, 2s. 6d. to 5s.; petty charges, 7s. 6d.; demurrage, the 4s. freight subordinate to immediate dispatch; railway, &c., charges, according to distance; fittage at port of shipment; reducing the price at the pit to less than the minimum charge for Silkstone, stated by the Engineering, Engineer, and Iron—first-class technical hebdomadaries permeating the coal mining districts—to have been selling at 5s. a ton, a natural reaction of the Durham coal trade on the entirety of the so-termed inland output with the present baneful system of the Durham and Northumberland coalowners consigning their coals to the London market to be disposed of on the Coal Exchange without reserve for what they may bring, a *modus operandi* fraught with the most direful results, as instanced in the wide-spread ruin in the North of England. It must be borne in mind that the freight of 4s. a ton is subordinate to immediate dispatch of the steamer; quite different from former times with sailing ships lying so many market days in the various Thames reaches. Mr. Lindsay Wood, a large Durham coalowner, gave evidence before the Select Committee on Coal in answer to Questions 3382 and 3668: "Our Durham coal is consigned for sale on the London Coal Exchange to intermediate coal merchants (by no means to the consuming public, which my undertaking will do, as the only legitimate and remunerative course), who sell it after levying, as officially alleged, an inordinate profit on the consumers." Sir George Elliot stated in evidence, in answer to Question 7655 by the same committee: "The main cause of all our low prices has been the redundancy of labour; it has never been anything else than the redundancy of labour that has kept down the price of coal." There cannot be any doubt but that the Durham coalowners are alone to blame for the immense loss inflicted on themselves and entailed on the inland districts and railways by their persistence in flooding the London market with their coal and selling it without reserve. That is the cause of the low prices; the coalowners, and not the pitmen or miners, being to blame.

The difference of 1s. 6d. per ton in favour of Silkstone coal, purchased at the pit mouth at 8s. a ton, over the ruinous net proceeds to the Durham coalowners comprises, besides all working and administrative expenses of whatsoever nature, a sinking or depreciation fund, interest at the rate of 5 per cent. on capital, working expenses, and coal traffic; further, an annual dividend of 10 per cent. The Chairman of the South Yorkshire and North Derbyshire Coalowners Association gave evidence on March 15, 1878, before a Parliamentary Committee in answer to Question 4247: "A reduction of 8d. a ton is quite sufficient to command the London coal market." In lieu of 8d. a ton I prove a saving of upwards of 6s. a ton in favour of the so-termed inland house coal over what Silkstone costs the coal merchants delivered to consumers on the basis in each case of 8s. a ton at the pit; and a saving of 10s. a ton on exclusively steam or land engine coal to Paris and the valley of the Seine.

The largest, wealthiest, and oldest established coal firm in Paris—owners of the largest coalyards contiguous to water delivery, trans-

ways, carts and horses—have agreed with me to act as agents, guaranteeing all sales, which places the French trade on the most secure basis. With closed stoves the consumption in France is exclusively steam or land engine coal, so that the undertaking will purchase not merely the house but also the steam and gas coals, which will be an immense boon to the coalowners, who have been compelled hitherto to stack their steam coal output during the many months the Baltic is closed by ice and the navigation necessarily impeded. The hypereminent evidence in the Hull, Barnsley, and West Riding Junction Railway Bill proves the futility of any attempt to compete with hitherto existing transit to Hull and Grimsby in the coal traffic.

I, with becoming modesty, confidently submit a sovereign panacea in favour of the Nottinghamshire, Derbyshire, and Yorkshire coal districts. Silkstone house coal, at a very different price from 5s. a ton—say, purchased at 8s. a ton at the pit mouth, and conveyed by the Great Northern Railway Company to their spouts in Boston at their quoted rate for a single truck load—can be delivered into consumers' premises in London at even a saving of upwards of 1s. 6d. a ton upon the disastrous speculative consignment price accruing to the Durham coalowner, whose displacement from the metropolitan coal supply is no longer a matter of hypothesis.

The proposed undertaking, via Boston Deepes, which has been for a lengthened period so exhaustively brought under the notice of the readers of the *Mining Journal* and *Colliery Guardian*, as the two chief coal mining hebdomadaries, has entered into the last phase preliminary to its speedy realisation. By means of a limited liability company, entitled the Seaborne Coal and Wood Company (Limited), initiated with a capital of 1,000,000l., with power to increase, the primary object being to supply London and Paris, via the Great Northern Railway and Boston Deepes, will effect, as shown in the sequel, a saving of several million pounds sterling, based upon a mere partial participation of the official returns of the import into London in 1879—10,058,811 tons, from 500 to 600 collieries, and average prices for present and last annual decennial periods, and the actual sales effected at pit mouth, with attendant transport, &c., expenses, in both cases to metropolitan consumers' premises. If we take a similar return for the last 50 years an augmented saving results, equally so if the parliamentary evidence of a leading London coal merchant be adduced as basis.

The accountants' return under the sliding scale arrangement in the Durham coal trade—the Ellison and Derby awards—show the deplorable state of the coal trade, as far as the owners and miners are concerned, which this undertaking is alone capable of alleviating, an exuberant margin existing to satisfy, upon an equitable apportionment, vendors as well as purchasers. The aristocratic, popular, and technical Press, in addition to the Minutes of Evidence taken before a Select Committee of the House of Commons appointed to enquire into the causes of the dearth, &c., of coal, and an official coalowners' circular of April 13, 1878, in the *Times*, and the Trade of the Tyne and Wear Report in the *Mining Journal* of July 3, 1880, have so exhaustively expatiated upon the immensely overstrained or excessive profits alleged to be exacted from the consuming public, and the anomalous and disreputable practices of the London coal trade, that it is necessary, in order to studiously avoid prolixity, to refer very cursorily to a few such data—short weight in a transaction well known on the Coal Exchange to the extent of 12 tons in a single bargeload; the *Times* and *Standard* of Oct. 11, 1878, publishing a letter headed "Organised Robbery," proving the delivery of 25 per cent. short weight—dual instances, afloat and ashore, of London coal trade rapacity.

Parliamentary evidence shows the advertisement of coals in the *Times* by numerous parties under a false name, and so delivered, at a less price than the legitimate or real denomination so falsely advertised could be purchased for at the pit mouth, the working, &c., classes mulcted by the coals passing through several intermediate hands, each levying a profit to the extent of 10s. to 12s. a ton in excess of the high price paid by the better classes for the coals bought of intermediate dealers, and a great deal of rubbishy (*sic*) class of coals sold in London at a high price for household purposes, sales having been effected at a non-remote period in London at 50s. a ton, whilst the current selling price in Yorkshire, the district of origin, was only a moiety, or 25s., whence the cost of coal, freight and delivery to consumers' premises in London was 12s. 8d. a ton, resulting in a profit to the intermediate wholesale dealer of 12s. a ton. The representative of the Miners' Association of South Yorkshire gave evidence before the Select Committee to enquire into the dearth of coal thus—"If you want cheap coal for the public the coalowners must go direct to the consumers. Half the nation is living out of the profits of coal, turning it over from hand to hand. The railway system (the transit by rail to London) will have to be broken down if you are to have cheap coal. I have proof of a coal merchant having a profit of 20s. a ton on 1500 tons." At a recent meeting of Northern coalowners at Morley's Hotel the metropolitan and provincial Press states it was alleged "one firm of middlemen is clearing one year with another 50,000l. per annum." The average price at the pits is only one quarter of the London selling price. The Registrar of the Coal Exchange, the highest official authority on the metropolitan coal trade, stated in evidence before a Parliamentary Committee that "advantage is taken of any opportunity to raise the price of coal to the advantage of the coal dealers." His 1879 annual report states—"Derbyshire and South Yorkshire coals are very little, if at all, inferior in quality to Durham and Northumberland." Mr. Scott attributes the immense increase, and especially that of 1879, of 1½ million tons over preceding year's import in the consumption of London chiefly to reduced cost, a series of annual price averages showing that of 1879 to be 133 per cent. less than that of 1808. This undertaking, by means of a large reduction in the cost to consumers with a better quality than what enters so extensively into the London supply from the middle men will create an immensely augmented consumption, with a much improved system of delivery and payment, especially in the case of small shareholders taking the benefit of credit. Holders of a single share can always have credit to the extent of the cost of their share, the importance of which arrangement is evident when workmen are suspended for a lengthened period on account of the weather and other causes, as has been recently the case, and when momentary credit is desirable. The company will purchase and transport in sacks Nottinghamshire, Derbyshire, and Yorkshire house, steam, and gas coal, and sell same in London, Paris, and elsewhere, the transit effected by the Great Northern Railway to Boston, where the coal will be conveyed in decked lighters to the steamer, in Boston Deepes, where the largest class vessels have discharged and loaded during time immemorial, perfectly sheltered in 30 ft. water at low water, with ingress and egress unfettered by docks, which will have the advantage of only half the distance to be traversed by the steamer as compared with the Tyne, and an infinitely better navigation from Boston Deepes. The transit from pit mouth to the Witham will, as predicted, be effected over the Great Northern Railway Company's system at a rate and tonnage giving them incontrovertably a much larger net revenue than for the entirety of their London coal transport calculated thus. The conveyance of coal by the Great Northern Railway Company to London in 1879 was, per official returns, 1,129,000 tons from Doncaster to King's Cross, 156 miles, at 5s. 10d. per ton for Yorkshire coal from Doncaster to King's Cross, traversing 1,100,775 miles. It must not be dissimulated that a large proportion of this quantity is handed over to the Great Northern by the North Eastern at a special compound through rate for London. An analogous remark is applicable to their apportionment of the through rate south of the Thames to Kent, &c. Their Notts and Derbyshire differential rate for the shortest distance to London is, as is well known, less than from the greater distance point, and weighs so heavily upon the vend of the Yorkshire coal in London which this Boston transit will equalise.

To acquire equal net revenue not one-fourth of the annual Thames and Seine coal requirements is computed, and that at a rate in excess of the Great Northern mean or average rate from eleven collieries to Boston, and identical with the addition of the South Yorkshire rate to Boston in each comparison for a single truck load. The Boston mileage traversed is only 33 per cent. of the Doncaster King's Cross mileage.

The undisguised outcome is of paramount import to the Great

The Mayor of Birmingham (Alderman Richard Chamberlain) read the Town Council on Monday a communication from Messrs. Richard and George Tangye, the well-known engineers, offering, if the Council will make provision for a permanent art gallery, to contribute a sum of 5000*l.* for the purchase of specimens of art for exhibition. Should an equal sum be subscribed by other persons, Messrs. Tangye offer to give a further sum of 5000*l.* for the same purpose. In the motion of the Mayor, seconded by Alderman Collings, M.P., the resolution was adopted, thanking Messrs. Tangye for their generous offer, and expressing the desire of the Council to comply with the conditions, and the General Purposes Committee were instructed to confer with the Free Libraries Committee, and report on the subject.

QUARTER-DAY'S EXHIBITS.—Amongst the most interesting of the exhibits on 'Change was a model of the Wilson Gas-producer. This producer is of a totally different character to those commonly in use, and is readily and advantageously applicable to all classes of furnaces. The impression resting on many manufacturers' minds by the fact that they have seen of gas-furnaces is that the system is both cumbersome and costly, and its advantages consequently open to question. The Wilson producer seems, however, to supply the desideratum of a cheap and efficient arrangement, occupying little room, and in all respects suitable to the needs of manufacturers who may desire to have their furnaces worked on the principle of a small outlay. So long as the fuel in a solid form is available, as at present, the constantly varying demand for the correct quantity of air can be supplied correctly, as far as ordinary appliances, manipulated by ordinary intelligence, admit, still the difficulty is only partly overcome, after the air has entered the furnace, the system of combustion does not ensure a proper mixing of the gases and air, and unless there is an intimate mixture, perfect combustion is impossible. These principal sources of loss are modified and lessened in varying degrees by the many systems of mechanical stoking and burning before the public; but gas firing has for many years been acknowledged as the highest authority on this subject to be the only method of obtaining perfect combustion in every respect, and it has long been foreseen that this system, if applied generally, in the interests of economy, cleanliness, and perfect control, must eventually be of national importance. We may add that the Wilson Gas-producer is applicable, not only to all classes of furnaces and stoves, but also to steam-boilers, and that it entirely prevents smoke. It has been adopted by leading firms in the iron, steel, metal, and glass trades, and the model is exhibited by Mr. Bernard Dawson, Malvern Link.—*Birmingham Daily Post.*

TRADE OF THE TYNE AND WEAR.

July 6.—The demand for Steam Coal for export continues fair—but is, for first-class steam coal—but all other branches are dull. As the make of iron continues large, and the strike in the iron trade in Cumberland has terminated, the prospect for coke is good; most of the coking coalworks are fairly employed, but this is, of course, the first season of the year for the house and gas coal trades. The first half of the year has now passed, and the progress made by the staple trades of the district has been, on the whole, disappointing; the only branch of trade which has improved much is steam coal, although coke has certainly, on the whole, improved, and gas coal has sustained its position. The house coal trade is in a very depressed condition; the supply of this coal to the Metropolis by sea and by rail is abundant as to cause prices to descend to a level which leaves no profit, if it does not entail a loss on all the coalmasters in the North, and also those whose works are in the Midlands; and there is also this strange anomaly, that this trade is in the hands of the middlemen or merchants, who continue to get a good profit out of the trade. This subject has engaged the attention of the coalmasters for some years, but as yet it does not appear that any decided steps have yet been taken likely to remedy this great evil.

The revival of the Coal and Iron Trades in the spring led to the opening out of many old shafts and a few new ones, and also to the slighting of numerous blast furnaces, and thus the supply of coal and iron has no doubt exceeded the demand, and consequently the price of these articles is very low, and little profit can be realised; indeed in too many cases a loss must be realised. The amount of business done, it is evident, is great, as is proved by the shipments from the north-eastern ports, and the increasing traffic on the local railway systems. Over production appears to be the evil at present, and so long as any material rise in price is met by increased production this must continue. The number of furnaces in blast at present are 110, and 55 out, making a total of 165 built. In this month last year only 100 furnaces were at work, little more than half the entire number. The Consett Iron Company, Messrs. Samuelson and Co., and Sir W. Armstrong have each one furnace in course of erection. The monthly returns of the Cleveland ironmasters are favourable. The stock of Cleveland pig-iron has only increased by 2382 tons during the month, there being on May 31 251,361 tons in hand, whilst there is now 253,743 tons, or less than six weeks' make. The exports amounted to 22,186 tons, or 357 tons more than were sent away in May last, and 21,378 tons more than were exported in June, 1879. This shows that though the American demand has fallen off there has been an increased export to Scotland and abroad. The trade is not receding; the make has decreased by 8908 tons, and nearly all that has been made has gone into consumption.

The claim of the Durham County colliery mechanics for shorter hours has been referred to arbitration, Mr. S. B. Coxon, of Usworth, and Mr. Douglas, of Peace's West Collieries, being the arbitrators for the coalmasters, and Mr. Crauford and Mr. Devor for the men. Sir A. A. Cross has accepted the post of umpire, and the case will be heard on the 12th of the present month at the Westminster Palace Hotel, London.

THE MINERS' PERMANENT RELIEF FUND.—The eighteenth annual meeting of this valuable society was held on Saturday at Durham. Mr. John Howie presided, and he first alluded to the much lamented death of Mr. Stobart by lightning on June 26. This gentleman was one of the first and best patrons of the fund. He had aided very much in promoting its formation, and also contributed munificently to its funds. The contributions to the fund for the year ending March, 1880, were 37,390*l.* The number of members in the society is 70,663—a slight increase on the previous year. It is pleasing to notice that there has been a considerable decrease in the number of accidents to members. The number of fatal accidents for the year is 108. The number of persons in the fund are as follows:—Widows, 34; children, 800; permanent disabled men, 232; aged miners, 1110; total, 2596. During the past 18 years the total income has been 24,000*l.*, and total outlay 246,000*l.*; the owners of collieries have contributed 35,000*l.* of this amount. The society is a most commendable one, and it certainly has conferred great benefit on the miners, and on the families of those who have been killed by accidents, and much credit is due to the founders, and we think especially to Mr. Blyth, who not only, we understand, originated the fund but has laboured most assiduously to promote its interests during the past 18 years. It is true that he has also acted as paid agent for the fund, and the agencies it appears costs 324*l.* per annum—a very small sum indeed for a society with an income of nearly 40,000*l.*, and yet it appears that a considerable portion of the members wish to work the fund without agents, and propose that the local secretaries do the business. A motion to this effect was negatived by a majority of 58, the number of delegates present being 243; the majority ought to have been much larger. It is extremely probable, if not certain, that if such a suicidal motion (as we submit this is) is ever carried the society would speedily fall to pieces; it would, in fact, then consist of a great number of small societies without cohesion or unity. A motion to increase the salary of the agent would in our opinion have been much more appropriate. The strike at some of the chemical works on the Tyne still continues, with no prospect of a settlement at present; but unless a rapid improvement takes place in the trade the men cannot resist a reduction long. Although the make is reduced owing to the strike, and no stocks of consequence are held, prices are drooping, the late rise in the value of chemicals has not been maintained. As remarked above, the general trade of the district during the first half of this year has been somewhat disappointing, but the prospect for the next half is generally considered to be assuring, with the exception of the trade expected to be done with Russia. The plate and bar mills at Messrs. Hawks and Co.'s works, Gateshead, were re-started on Monday, but some branches of the iron trade in Gateshead continue slack. In Newcastle Messrs. Hawthorn and Co., and Mr. Stephenson and Messrs. Clark are fully employed with locomotives, marine engines and boilers, &c. The iron ship building trade and marine engine

trade at the river works on the Tyne, at Mitchells, Jarrow and South Shields, &c., are pretty fully employed, as they have been for some time.

The new docks at Hartlepool were opened on Tuesday, a large Norwegian barque from Pensacola drawing 19 ft. 4 in. was taken into the dock. The Hartlepool now possess a dock area of 176 acres, and also extensive timber ponds. The area of some 350 acres consists of a system of docks and timber ponds, to which access can be had either from the deep water entrance at Hartlepool or that constructed 30 years ago at West Hartlepool, and the largest or deep water dock now used has an acreage of 18 acres, with a depth of 27½ ft. of water. The total extent of the stone walling of the system is 6000 ft., exclusive of the tidal basin. Extensive warehouses and cranes are soon to be erected in addition to the present accommodation, and when these additions are completed the Hartlepool will offer a port unsurpassed in excellence and safety of entrance by any on the north-east coast of England.

LEAD MINING IN TEESDALE.—At the Green Hurth Mine the large shaft has been sunk 14 ft. below the bottom of the limestone, on the top of which the 130 fm. level is driven. In cutting out the ground at the bottom for water storage the vein has been cut, and it is found to yield excellent ore. This is a most important discovery; it is now found that the vein is not only through the whole of the limestone but far below the sill. There is every reason to suppose that the vein will prove rich to a greater depth. The shaft, which is now completed, will afford means to work cheaply and efficiently, the rich ore lying below the 130.

WAGES IN THE IRON TRADE.—The return of the accountants in connection with the sliding scale regulating the wages of the Cleveland miners and the blast-furnacemen, and which is based on the average net selling price of pig-iron, has been issued. The price of No. 3 pig-iron, which governs the wages, was for the last quarter 42s. 4d. per ton, being 4d. per ton less than in the preceding quarter. Wages, therefore, will remain the same, but the men have been since November last in receipt of a substantial addition to their wages.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

July 8.—The Potteries, Shrewsbury, and North Wales Railway, which connects Shrewsbury with the Cambrian Railway at Llanynech, is now to the great inconvenience of the neighbourhood closed for traffic. This line was one of the grand schemes floated during the railway mania. It was originally intended to connect Stafford and the Potteries with Shrewsbury, and from thence passing Llanynech and running up the Tanat Valley, past Llangynog, and through the Berwyn Mountains to Bala and the Great Western Railway. Only a portion of some 18 miles was ever made, and this since its construction has drawn out a miserable existence, always in debt, sometimes in charge of a Sheriff's officer, once before closed for traffic, and generally, both in its practical and financial arrangements, in a most unsatisfactory condition. It is announced that a new company have purchased the line, and that extensive alterations are to be undertaken.

An accident occurred lately at the Penmaenmawr Quarry by which two men named Griffith Jones and John Williams were killed. The men were working on the face of the lower gallery, being suspended from the top by ropes. They had just prepared a blast when a mass of rock, said to weigh some hundreds of tons, suddenly fell, carrying the men with it, and crushing them in a terrible manner. Jones was killed at once, but Williams lingered a short while. Both the men were married.

The select committee appointed to enquire into the Liverpool Water Bill has presented their special report to the House of Commons. The report is in favour of the scheme as a whole, but takes exception to some of the details, which, however, do not affect the general principle of the scheme. The workmen of this neighbourhood are anxiously looking forward to the commencement of the works, and many enquiries are being made as to the probable date. One cannot, however, venture to prophecy this, as the bill is not yet law, and even if it were, the works may be delayed indefinitely.

Some time ago I mentioned the destruction of fish caused by the waste water from mines. A letter appeared lately in the Field speaking strongly about the damage caused by the pollution of the Severn and its feeders, near Llanidloes, by means of the water flowing from the numerous mines in the district. The Van Mines and the Bryntal Mines were especially mentioned. In the latter mine so much slime is allowed to run off that a sediment is deposited on the rocks in the river as much as four miles below the mine. Now this distinctly points to some mismanagement of the dressing arrangements at the Bryntal Mines. Why is all this valuable slime allowed to be thrown away? It must contain lead in some form or it would not destroy the fish, and no mine can now afford to throw away an ounce of lead. It is reported that the Atlas Ironworks, Manchester, have just taken orders for sixty new locomotives, most of which are for England. There is a proposal now on foot for the construction of a narrow gauge railway, which will be of very great convenience to a number of the Cardiganshire mines, and will add greatly to their value. The railway is to start from Trawcoed, on the Manchester and Milford Railway (the line which connects Aberystwith with Carmarthen), from there it would run to Llangurig, and from Llangurig to Llanidloes. The projected railway from Llanidloes to Aberystwith was constructed as far as Llangurig, and would of course be utilised for the purposes of the new scheme. Now is the time for all those mines which are interested to join together in support of the scheme, and not with mere verbal support, but with something substantial, and leaving some ratio to the benefit which will afterwards accrue to them. There should be no quarrelling about the gauge, or such matters. The chief thing is railway communication, which is the only remedy for the present destructive effects of the costly land carriage.

The Coal Trade in this district keeps very dull, and very little business is done, especially in house coal.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

July 8.—Reports from the leading mining districts are to the effect that matters have been going on much as usual at the mines, whilst no new developments have taken place. A considerable tonnage of ironstone continues to be imported from Northamptonshire, so that comparatively little attention is being paid to the local ironstone, which at one time was most extensively worked. The output of the furnaces has in no way declined, although the demand is considerably below what it has been for Staffordshire, Lancashire, and other localities nearer home. In finished iron there is also greater quietness, the consumption in Sheffield and the neighbourhood of ordinary merchant iron not being so large as it was a few weeks ago, so that the mills are by no means active. The foundries are kept tolerably well going in pipes and other material, but the number of hands employed is not so large as at one time. The Coal Trade is in anything but a flourishing state, and the colliers are on short time, so that many of the miners are not working more than three days a week, and only earning some 10s. or 12s. a week. House coals sell slowly as a rule, still for the month a fair tonnage has been forwarded to the Metropolis, but at prices that cannot be said to leave a profit. Owners, however, do all they can to find employment for their workpeople, and for which they have but scant credit from those who call themselves the miners' friends, as witness the Bill for granting compensation to workmen, which will affect the mining community more than any other, and must lead to a great deal of dissension and bad feeling between masters and men, and divide their interests, which should be identical. The hollowness of the Bill has not been more fully exposed than by Mr. C. Markham, the managing director of the Staveley Company, and Mr. J. Storr Smith, the managing director of the Sheepbridge Coal and Iron Company. They have shown that the insurance funds established and supported by companies have met every requirement, so that no legislation whatever was necessary. What is required is a better trade, so that the workmen could earn better wages, and were the Government to try and effect this the result would be most gratifying, and far more satisfactory than legislation calculated to make masters and men antagonists. It is

gratifying to find that the services of Mr. Howard, the secretary of the Derbyshire Engineers' Association, and who did so much for promoting the erection of the Stephenson Memorial Hall, are about to be recognised, a fund being raised to present him with a suitable testimonial, which he certainly well deserves.

There is nothing new to report with respect to the trade in Sheffield, the heavy branches being still very quiet, whilst consumers of both pig and merchant iron only make purchases for their immediate wants. In South Yorkshire the trade in coal is particularly quiet, and there are rumours of failures abroad, of which more will be heard hereafter. Steam coal is still in brisk request, but prices are still low and unremunerative.

NEW WEIGHING MACHINERY.—A remarkable specimen of workmanship has just been completed by Messrs. Samuel Denison and Son, of Leeds, in one of their large and powerful suspended weighing machines (H. D. Denison's patent) manufactured for the Dutch Government. The machine has almost the delicacy of a chemist's laboratory balance, yet is constructed to bear almost any amount of rough usage. The entire machine measures but 40 in. by 33 in., yet is capable of weighing 50,000 kilos, or 50 tons, and turns with 4 lbs. with the full load on—a result which was in the highest degree satisfactory to the two Dutch engineers who were specially sent over to thoroughly test the adjustment of the machine. The indicating lever is of nickel silver, and the whole machine is artistically ornamented, without in the slightest impairing its strength and utility, and the smaller sizes (for they are made small enough to weigh 10 cwt.) are really elegant little instruments. There are no springs whatever in the machine, judiciously arranged levers moving on steel fulcrums being alone used. Messrs. Denison may well be congratulated upon the perfection to which their weighing machines have been brought.

Meetings of Public Companies.

COLONIAL BANK.

The eighty-fifth half-yearly general meeting of proprietors was held at the Bank House, Bishopsgate-street, on Thursday, Mr. T. D. HILL in the chair.

Mr. JAMES CLARK (the secretary) read the notice convening the meeting, and the subjoined report of the directors was submitted. In accordance with the provisions of the Charter, the directors submit to the proprietors the following statement of the debts and assets of the corporation on Dec. 31 as follows:—

DEBTS.	
Circulation	£ 452,020 12 6
Deposits, bills payable, and other liabilities	2,931,581 12 11
Paid up capital	600,000 0 0
Reserved fund	57,543 14 9
Balance of profit from last half-year	1,412 2 5
Net profit for the half-year	38,343 7 5
Total	£4,121,003 10 0
ASSETS.	
Specie	£ 304,148 1 1
Due to the bank in the colonies on bills discounted and purchased (including those past due), &c.	1,405,088 4 4
Due to the bank in the colonies on current accounts	24,607 9 9
Due to the bank in London on bills remitted, cash at bankers, &c.	2,377,159 14 10
Bank premises and furniture in London and in the colonies	10,000 0 0
Total	£4,121,003 10 0

It affords the directors pleasure to present the foregoing statement, which they do not will be considered satisfactory by the proprietors. The favourable anticipations regarding the price of sugar and of the crops in the West Indies, referred to in last report, have not been fully realised, but the result to planters generally will this year be remunerative, and the directors are happy to state that the accounts from the branches are, on the whole, satisfactory. They propose, therefore, that out of the net profit stated above, which, after providing for all bad and doubtful debts and for income tax, amounts to £38,343 7 5, added to the amount brought forward of £1,412 2 5

Together £39,755 9 10
An ordinary dividend of 6 per cent. b. made on the paid-up capital for the half-year ending Dec. 31, which will require ... 36,000 0 0
And out of the balance of £3,755 9 10
It is proposed to carry ... 2,354 5 3
To reserved fund, increasing that fund to the satisfactory total of £100,000, and leaving ... £1,401 4 7
To be carried forward to the next half-year.

The CHAIRMAN said that with regard to the report which they had just heard read they would no doubt have observed that the item for bank premises and furniture in London and the Colonies had been raised to 10,000*l.*; this was still very much below the actual value, and they proposed to keep it at that sum. To balance the account 2645*l.* 14s. 9d. was transferred to the reserve, and by adding, as is now proposed in the report, 2354*l.* 5s. 3d. they brought the total amount of the fund up to 100,000*l.*, at which they might fairly let it remain for the present at least. He did not doubt that the arrangements which the directors had made would give general satisfaction to the shareholders, and he might take the opportunity of congratulating them upon the manner in which the dividend had been maintained. This encouraging position of their affairs was the more gratifying seeing that the general improvement in the West Indian sugar trade, which they had looked forward to at this time last year, had not been realised. The partial failure of the beet sugar crops had had a temporarily beneficial effect upon the cane sugar industries of the West Indies, but the last accounts from the colonies do not indicate any revival of trade as they had hoped for. They had notwithstanding been able amply, as they believed, to provide for all bad and doubtful debts, and he might say that the bank was never in a better position than at the present time to take advantage of any movement calculated to be of benefit to it. There could be no doubt that, as he had frequently told them, the interest of the bank was to a great extent bound up with the staple produce of the West Indies—cane sugar, and that whatever improved the position of the producers of that article tended to the direct advantage of the bank. The production of the bounty-fed beetroot sugar had lately been increasing at the rate of 100,000 tons a year, and they could readily understand that this production seriously affected the growers of cane sugar, with whom much of their business was carried on; he was, therefore, particularly glad to hear that the Committee of the House of Commons appointed to consider and report upon the question of the bounties allowed on beet sugar by certain continental States were in favour, or at least the majority of them were in favour, of a countervailing duty. He concluded by formally moving the reception and adoption of the report.—Mr. HENRIQUES seconded the motion.

Mr. STOTT enquired what amount of the 2,377,159*l.* 14s. 10d. which appeared on the asset side of the accounts as "due to the bank, cash at bankers, &c.", was really in cash.—The CHAIRMAN scarcely understood what was the precise meaning which the proprietor put upon the term "cash." They had rather over a quarter of a million in Consols.

The SECRETARY remarked that technically that would not be "cash;" but he thought that what the honourable proprietor wished to know was how much of the 2,370,000*l.* was at once available (Mr. Stott assented), and this would be answered by stating that the greater part of the amount could, if necessary, be made available at a week's notice.

The report was then unanimously agreed to; and, upon the proposition of the CHAIRMAN, seconded by Mr. HENRIQUES, the dividend was also sanctioned.

Mr. BRAVO rose for the purpose of again reminding the proprietors that they were much indebted to the Chairman and those around him for the excellent position the bank is in. The figures in the balance-sheet exhibited a combination of prudence and discretion; and, although he did not doubt that by undertaking more dangerous and speculative business the directors might temporarily have earned them larger dividends, he felt it best to have his money in a safe investment, and, therefore, had much pleasure in proposing a vote of thanks to the Chairman and directors.

Mr. J. W. BENTLEY very willingly seconded that motion, but thought it would be well to include in the vote the secretary and officers of the bank.

Mr. BRAVO fully concurred in the modification, and on putting the amended resolution to the meeting it was unanimously carried.

The CHAIRMAN, in acknowledging the compliment, remarked that he could safely say that the board fully endorsed the recognition which the proprietors had expressed with regard to the secretary and officers of the bank.

The SECRETARY, on behalf of himself and all other officers of the bank, thanked the meeting for the vote, and expressed the hope that they would continue to deserve it.—The meeting then separated.

ENGLISH-AUSTRALIAN GOLD MINING COMPANY.

The ordinary general meeting of shareholders was held at offices of the company, Austinfriars, on Tuesday.

Colonel H. JELLY-SHARP in the chair.

The SECRETARY read the notice calling the meeting.

The CHAIRMAN formally moved the adoption of the report and accounts.

Mr. SCHOFIELD (director), in seconding the resolution, said it must be gratifying to everyone to find that in the course of opening the mine, and particularly in the rise, they had intersected a run of auriferous quartz, the extent of which was unknown, but which he had no doubt, from the language used respecting it by the mining agent, would yield results which would leave the shareholders a considerable profit. The gold was above the standard. The present number of stamps could be increased. If this quartz were as important in quantity as they supposed there could be no question as to the desirability of erecting more stamps. The machinery was powerful enough, and there was little doubt they were now making profits, and would continue to do so. A new manager had been appointed in consequence of the death of the old one. They had had a good character with him, but they could not say much about him at present. He had no doubt he would continue to give them satisfaction. On the whole, there was a good outlook before the company, and he felt satisfied they would soon have a largely profitable mine. Mr. Schofield concluded by seconding the Chairman's motion.

Mr. POWELL: You appear to have a very good neighbour.

Mr. SCHOFIELD: They want tell us what they are doing.

A SHAREHOLDER: What is your financial position?—Mr. SCHOFIELD: We have above 18000 credit balance.

The SECRETARY: The preference shares only take 6000, so there is an ample margin for profit for the ordinary shares.

Major BELL: Will the shaft cost you to complete to the next level?

The SECRETARY: 8000, including the pumps, and the lower we go the longer is our run of quartz. We should also get more quickly into it, as the dip is towards the shaft.

Mr. SCHOFIELD: We have two shafts, which very few mines have.

Mr. JERU HITCHINS: What is your driving power?—Mr. SCHOFIELD: Steam. Our engine (about 30-horse power) is capable of driving more stamps.

Mr. MURCHISON said that Mr. Lewis, mining inspector, and the highest report in the colony, reported for the company specially upon the mine in August, 1877, and subsequently offered to take it on tribute, spend 30000 in developing it, and give a good royalty to the shareholders. His report at that time was most favourable.

Mr. SCHOFIELD: And we have now the mine in the position that he wished it to be in.

Major BELL: Are the directors receiving any fees?—The SECRETARY: They will get no fees except out of profits.

The CHAIRMAN moved the resolution of Mr. Lamb as a director. This gentleman, whose absence to-day he regretted, had had considerable local experience of the property.—Mr. SCHOFIELD seconded the motion, which was carried unanimously.

The CHAIRMAN moved the confirmation of the election of Mr. Schofield as a director, in the room of Mr. S. W. Dawkes, deceased. He was sure they all deplored the loss of Mr. Dawkes, with whom he had had the pleasure of co-operating for a period of 10 years.—Mr. POWELL seconded the motion, and expressed his great pleasure that a man of Mr. Schofield's energy and ability had consented to join the board.

Messrs. Brandt, Sausfeld, and Co. were then re-elected at a remuneration of five guineas.

In reply to a question, Mr. MURCHISON explained that there was good supervision of the accounts in the colony.

Major BELL suggested that a plan of the mine should be suspended on the walls of the office.

Mr. SCHOFIELD promised that this should be done. By-and-by this would be a great mine, and to make it so he would spare no personal time or energy.

The CHAIRMAN congratulated the shareholders on the different aspect their affairs had now assumed. He could quite endorse what Mr. Schofield had said, and thought that their future would be a bright one.

Mr. JERU HITCHINS moved a vote of thanks to the Chairman, and said the steady adherence of the directors to this mine would be called by some "obstinacy," but when it succeeded it was called "perseverance." (A laugh.)

Mr. POWELL seconded the motion, which was agreed to, and the proceedings were then brought to a close.

PLACERVILLE GOLD QUARTZ COMPANY.

A general meeting of shareholders was held at the offices of the company, Great Winchester-street Buildings, on Thursday.

Mr. J. IRVING COURTENAY in the chair.

Mr. H. DELL (the secretary) read the notice calling the meeting.

The CHAIRMAN said: The operations of the past year are fully set forth in the report of the general manager, and I now propose to comment on them. Shortly after my arrival at the mine in August last the work of removing the mill buildings to their present site was commenced, but we did not fix upon the precise location without having first had careful surveys made of the surrounding locality, and after giving full consideration to the present condition and probable future requirements of the mine. The result of this examination satisfied us that it would be well to make a small additional purchase of land, the cost of which appears in the balance-sheet, and to build the mill near the creek that runs at the base of the hill on which the mine is situated, and by means of a tramway to convey the ore from the shaft to the mill. The next point was to determine the description of hoisting works to be erected, and it was finally decided to construct them of a size and power that would be sufficient for all purposes for many years. They are capable of hoisting ore from a depth of 1200 ft. Seeing that the mine was daily improving in appearance, and that there was every probability this improvement would continue the deeper the vein was worked, I consider it would have been a wrong policy to put up either the hoisting works or other machinery of a capacity that would have necessitated at a comparatively early date fresh works. I watched the foundations for the mill being excavated, and the heaviest part of this work was finished when I left in October, and I do not think that any more solid or substantial structure could be built. I understand that the whole of the other works equal it in quality. Their total cost is £23,311-18; there is included in this the machinery for another 10 stamps, to be erected whenever required. The mill has at present 20 head of stamps, and each stamp crushes 1½ ton of quartz per day; this is fair work considering the hardness of the quartz to be treated. The machinery both of the mill and hoisting works is run by water. I now turn to the mine, and to correctly apprehend the changes and developments that have taken place in it I must remind you of its past history as far as I know. In the upper levels the vein is very wide; this portion of the mine was worked in the early days of Californian mining, and in the course of their workings the first owners met with the break above the 300 ft. level by which the vein was pinched and disordered; and, as they had neither the capital nor skill to get over the difficulty, they abandoned the mine. After a long interval the present company took it up, and began by sinking simultaneously the shaft and winze to the 400 ft. level. The result was what was anticipated—as we got further from the point of disturbance the vein gradually recovered much its former size and character, and from about 2 ft. in width it increased to over 11 ft. in the winze above the 500 ft. level; this was the width of the vein when I was at Placerville, since which you will observe by Mr. Price's report it has widened out to 18 ft. in the 500. The total quantity of quartz crushed up to date of his report is 2276 tons, yielding in gold \$24,802, or an average of about \$11 per ton. The May yield per ton was low, owing to the necessity of working some low grade ore which was encountered in the 5th level. Mr. Price writes on this subject on June 18—

"Since writing you last I have paid two visits to Placerville, and I am pleased to be able to inform you that the stopes were yielding better quartz, as a whole, the vein, however, is still more or less mixed with slate in both the north end of the stopes above the 400 and 500 ft. level drift; in the latter place, however, considerable coarse gold was visible even in the slate; this part of the mine looked very favourable. I am in hopes that this month will come up to the average of our previous crushings." These variations must be expected, as we have to take the mass of the quartz just as we find it; with so wide a vein and the present amount of development there can be no question that the stopes were yielding better quartz, as a whole, we sink another 100 or 200 ft., and have other levels opened, there will be a better opportunity of keeping up a uniform average monthly yield. The reserves of quartz developed, or, as it is called in mining phraseology, of ore in sight, are estimated by Mr. Price at not less than 25,000 tons, and it may reasonably be expected that the bulk of this quartz will yield about the same value of gold per ton as it has hitherto done, and seeing what developments have been made in the last 200 ft. that as greater depth is attained the mine will still further improve. The question of working cost is of the greatest importance, and it is satisfactory to note that even at first starting—for we have had only two months regular work—the cost of mining and milling the quartz is not in excess of the estimated figure, the cost per ton for April being \$6-13, for May \$5-47, and I hope that as the mine is more fully developed the working cost may be further reduced. This left a profit for April of 5000, and for May of 3000. As soon as the company can afford the outlay it will be most desirable to introduce machine-drills; ours is just the mine where they will be of the utmost service, the vein being large and the quartz hard, and we can utilise the waste water from the hoisting works to drive them. They will cost complete \$5000. Last winter in California was, as you know, of unprecedented severity, the frost in duration and intensity being more severe than hitherto experienced, and the water company was not prepared for the emergency, and could not supply the necessary amount of water, so that the mill did not begin to crush ore until March. I am informed that they will take steps to guard against this state of things for the future. You will thus see that a portion of the extra outlay was incurred from causes beyond the control of the directors, and I trust the shareholders will approve their policy both in regard to the reduction works and the development of the mine. Should the resolution increasing the capital to 60,000 be approved, the shareholders will have the option for a period of (say) 10 days of taking up their quota of the new capital at par, but at the expiration of that time the board will allot the shares not applied for as they may see fit, and as the capital even when

increased to the above amount will be moderate in comparison with that of many gold mining companies, while the actual results are of a satisfactory character, and the prospects extremely good, the directors expect to issue such shares upon favourable terms for the company. (Hear, hear.) Gentlemen, I now beg to move the adoption of the report and accounts.

Mr. J. J. WARD seconded the resolution.

A SHAREHOLDER asked whether they used the Elephant stamp mill they had there.

The CHAIRMAN said they did not, as it did not all arrive in time. shipped together but was separated on trans-shipment at Panama, brought over to the mine in detachments. It had been set up and so much made, but there had been no time to complete them.

The resolution was then put and carried.

The CHAIRMAN moved that Mr. Reginald Bird and Mr. J. E. Bowe be re-elected as directors of the company. He might mention that Mr. Bowe thought of going to California shortly.

Mr. E. NEAMIS seconded the resolution, which was put and carried.

The CHAIRMAN said that it had been thought desirable to add another member to the board; he had, therefore, great pleasure in proposing the election as a director of Mr. George Wm. Dixon.

Mr. J. J. WARD seconded the resolution, which was put and carried.

On the motion of Mr. J. D. Cobb, seconded by Mr. G. W. Dixon, the retiring auditor, Mr. James Meston, was re-elected, with a remuneration of 10 guineas.

The CHAIRMAN said they had the largest portion of the capital represented in the room, and all approved of the proposition for increasing the capital.

He moved, "That, on the recommendation of the directors, the capital of the company be, and is hereby increased, by the creation of 5000 ordinary shares of 20 each, such shares to be first offered to the members in proportion to their existing shares, in accordance with clause 6 of the Articles of Association." He might mention that although they took power to increase the capital by 10,000, it was not intended to issue more than 6000 at present. It would be offered, in the first instance, to the shareholders on the register. He thought that ten days from Saturday next would be sufficient time to give shareholders in which to make their application for their quota of shares. The sooner the capital was issued the better, as they were paying interest on the debt, and the interest was rather high. He trusted that during the next two or three months they would get rid of that debt; if it was paid off there was already an amount of 8000 in hand towards a dividend. The capital of the company being small, a small amount of money would pay a good dividend. He hoped this month would also contribute something towards the divisible profits. The shares would be offered in the first instance to the shareholders at par.

Mr. J. J. WARD seconded the resolution, which was put and carried.

A SHAREHOLDER moved a vote of thanks to the Chairman for the pains and trouble he had taken, and the attention he had given to the business.

A SHAREHOLDER seconded the resolution, which was put and carried.

The CHAIRMAN: Of course you include the other directors in it. I can only say that when I was in California I saw the mine developing in a way which could scarcely have been anticipated, and there can be little doubt that the deeper we go the more it will continue to improve. I hope next year we shall meet you under even more favourable circumstances than now.

The meeting then broke up.

GOLD COAST MINING COMPANY.

The first general meeting was held at the company's offices, Gresham-street, on Wednesday. There was a large attendance of members.

The notice convening the meeting having been read, Captain MOLESWORTH, R.N. (the Chairman), stated that although this was merely a statutory meeting, and the company was too recently formed to allow him the pleasure of reporting any results, he desired to give all information in his power. He stated the great pains he had taken to assure himself of the value of the property before deciding to invest in the company and join the directors; that the company being successfully formed it was determined, after consultation with mining authorities and the consulting engineer of the company, Mr. Dahne, not to send out large quantities of tools and machinery at the outset, but to wait the report of their own mining engineer, which would enable them to work better than in India; that the prospect of the mine was very preliminary waste. That the mining staff went out on May 15, will have been at Axinabout June 7, and that the first report from the mines could not be looked before the middle of August. An ample though moderate quantity of tools and implements had been sent out with the staff, and the experience of the mining companies who had preceded them had enabled them to make great economies in comparison with those companies. The Chairman said further that Mr. Harvey, a great authority on gold mines, reported that the prospects on the Gold Coast were far better than in India; that the board had been informed that should the report of their mining engineer fully bear out previous information, which he believed it would, and that all assays and reports since the formation of the company tended to strengthen his conviction that there was a just expectation of great results.

Many questions were asked by shareholders as to the number of shareholders, which were stated to be over 300, the character of the strata, mode of working, &c., and specimens were exhibited of ore stated to have come out of the 70 ft. deep and 12 ft. by ft. on the company's property, and which assayed several ounces of gold to the ton of ore.

Capt. Peacock's pamphlet, in which was contained that the Gold Coast was the ancient Saba of the time of Kings David and Solomon, was also mentioned.

Mr. IRVINE (director) stated his most favourable conviction founded on his personal knowledge of and experience in Africa. Their greatest enemy he said was the climate, which was unmistakably bad, but which might be endured by care and proper precautions. He confirmed that the prospects on the Gold Coast were far better than in India; that the board had been informed that should the report of their mining engineer fully bear out previous information, which he believed it would, and that all assays and reports since the formation of the company tended to strengthen his conviction that there was a just expectation of great results.

Mr. RAWLE, a shareholder, who said Mr. Harvey had similarly expressed himself to him, speaking in the strongest manner of the great wealth of gold in that African district where the Gold Coast Mining Company's property is situated. We have been informed that shortly after the close of the meeting letters arrived from the Gold Coast with the information that the first shipment of gold by the French Company (the African Gold Coast Company) was made early in July, reaching England in August; that everything was proceeding most favourably, and that the difficulties having been overcome. The arrival of the gold above mentioned, which will be the first known result of gold mining enterprise in West Africa by Europeans will mark the commencement of an era in West African history—the grain of mustard seed to become a great tree. We feel a little national pique that a French company (though partly English by-the-by) should have the wreath of honour, but they have worked hard, persevered, and deserved it.

The shareholders present as a body requested that publicity should be given to what passed at this meeting, which they regarded as most satisfactory, and that monthly reports from the mine should, if possible, be published and brought to their knowledge, which was promised by the board.

The Hon. F. H. MORSE (director), pointing out that the interest of the shareholders and the board were identical, the members of the board not being inconsiderable shareholders, and that they had every reason to believe in success.

Mr. W. LYNDE proposed the usual vote of thanks to the Chairman, which was seconded by Mr. C. RAWLE, and carried unanimously.

COLORADO UNITED MINING COMPANY.

An ordinary general meeting of shareholders was held at New Exchange Buildings, George-yard, Lombard-street, on Wednesday.

Mr. J. COOPE DAVIS in the chair.

Mr. F. ANDREWS (the secretary) read the notice calling the meeting.

The CHAIRMAN: Gentlemen, I think you will all agree with me in regretting very much indeed the absence of Sir Cecil Beadon to-day, the more so when I tell you the cause of it. I am sorry to say he is very seriously ill from affection of the lungs, and is obliged to keep his room, and we can only hope the summer weather we expect to have shortly will put him right again, and he will resume his duties at the board. (Hear, hear.) With respect to the first resolution which I shall have the honour to submit to you, which is that the report and accounts as sent to the shareholders be received and adopted, I will trouble you with only a few words, and express the regret of the directors that the report is of such a meagre character, and so unsatisfactory to them as well as to the shareholders, and so different from what they were led to expect at the meeting last year. I dare say many of you will remember that very day—namely, July 15—when I received a telegram from Mr. Hamill, and it concluded with this remark—"In my opinion you will be entirely out of debt by the end of October." You will remember we all went away rather hopeful, thinking that by the time we met again we might, perhaps, divide something, although it might be but very little; so far from that being the case, by these accounts it is shown that we have only paid off 22500 of that debt, which leaves 40000 owing. There has been another great source of dissatisfaction to the directors and shareholders as well, and that is the very few advices we get from Mr. Hamill. Instead of receiving, as we ought to do, a weekly or even monthly letter, during the nine months we only received three letters from Mr. Hamill. True he had an accident, and was laid up, but we telegraphed and wrote to him, requesting him to let his clerk send us news how things were going on. The last letter which we received from Mr. Hamill, with the exception of the one received this morning (which I will allude to presently), was in March last, and an admirable letter it was, giving us a full and clear account of everything. It was not a sanguine letter, but an admirable letter. Since then we have only received three telegrams, which I will read to you. One was on May 24:—"My accident has prevented communication every day since, and yesterday I was at the office only, asking the secretary if anything had come, but nothing had come. But this morning it has arrived, and we received a telegram and also a letter."

The SECRETARY then read the following extract from the letter:—

"After detailing expenditure on improving the property, amounting to \$35,000, Mr. Hamill goes on to say:—"Many of these necessary but expensive improvements are permanent, and hence will not have to be duplicated, necessarily cutting down our disbursements the coming year for like work. When it is

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The reduction of output in March, April, and May was owing to an immense water-course encountered. Stopes had to be suspended, and we could do little else than keep the mine free. Terrible never looked so well as now." We heard nothing further until this day week, when we got this telegram:—"If at all possible have general meeting postponed until the 25th inst.; important communication to make." We telegraphed immediately:—"The directors regret postponement legally impossible." Of course we have been expecting this important communication every day since, and yesterday I was at the office only, asking the secretary if anything had come, but nothing had come. But this morning it has arrived, and we received a telegram and also a letter."

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Lectures on Practical Mining in Germany.

AUSTHAL MINING SCHOOL NOTES*—No. CLVII.

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,

Mining Engineer, Wakefield.

(Formerly Student at the Royal Bergakademie, Clausthal.)

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NATURAL VENTILATION.—Every motion of the atmosphere is produced by a change in the pressure of the atmosphere, and the tendency of the atmosphere to set itself again in equilibrium. The variations of atmospheric pressure are indicated by the barometer, and may be looked upon as caused in almost all cases by a change of temperature. The change of temperature operates by causing an expansion or a contraction of the air, which alters the density of the air, and consequently its pressure.

The two shafts of a mine connected together by a series of levels, as it were, an inverted syphon, containing air as the fluid. If the two ends of the syphon are in the same horizontal plane—that is, if the two branches are of the same length, and the fluid is of the same density—there will be equilibrium, and consequently no tendency to motion. If, however, the branches are unequal, or there is a difference of density of the fluid in the two branches, there will not be equilibrium, and the heavier of the two columns will descend, and the lighter one to rise. If now we imagine the descending column to be rarified as it passes into the exit branch of the syphon, and the other branch constantly supplied with air from a reservoir of the original density of the descending column, we shall have a constant current of air descending the one branch and ascending the other.

The natural ventilation of a mine is caused by the difference in temperature of the air at the surface and underground. The daily and yearly changes in the pressure of the atmosphere and ground are perceptible only down to a depth varying from 70 to 100 ft., according to the nature of the rocks between that depth and the surface. Below this a gradual increase of temperature occurs of about 1° Fahr. for every 60 ft. increase of depth.

Roughly speaking, we may take the mean temperature throughout the year in the mining districts of England at 45° Fahr.; that during the winter months, December, January, and February, at 35°; that during the three spring months, March, April, May, at 46°; that during the three summer months, June, July, and August, at 56°; and during the three autumn months, September, October, and November at 48° Fahr. At a depth of 80 ft. we may assume the temperature of the ground is constant, and for any mine working at a less depth than this that the change of temperature at the surface is more or less felt, and that the summer temperature of the surface is lower and the winter temperature higher than that at the surface. Hence in the case of such a mine, worked by a shaft and an adit level, the air current will descend by the shaft in the summer and enter by the adit in the winter. In the case where the mine is ventilated by two shafts there will be no natural ventilation during the summer, since the air in both shafts will be cooler than that at the surface; whilst in the winter the air in the mine being warmer will tend to ascend in both shafts, so that the direction of the current down one shaft or the other will be dependant on secondary causes.

In the case of a mine 300 yds. deep the temperature of the ground at 80 ft. depth being assumed constant and equal to the mean surface temperature 45° Fahr., and the rise of temperature at 1° Fahr. every 60 ft. of depth, the temperature of the mine will be (900 - 45) 60, plus 45° = 583° Fahr. This gives a difference between the temperature of the mine and the mean winter temperature at the surface of 233° Fahr., and between the temperature of the mine and the mean spring temperature at the surface of 123° Fahr., and the mean summer temperature at the surface of 14° Fahr., and the mean autumn temperature at the surface of 104° Fahr. From this it will be evident that in the above case the power of the natural ventilation is about twice as great in winter as in spring or autumn, and that in summer the natural ventilation will be nil.

A consideration of the above figures will also show that for a mine 300 ft. deep the air of the mine will have the same temperature throughout the year as the average of the mean spring and autumn surface temperature, and that during three quarters of the year the natural ventilation will be nil, supposing the mine to be worked by two shafts. If in this case the mine is worked by a shaft and an adit the ventilating power will be about equal in summer and winter, but the direction of the current will be down the shaft in summer, and up the shaft in winter; whilst in spring and autumn the ventilating power will be little or nothing.

The ventilation in the case of a mine 300 yards deep, worked by an adit and shaft, is not essentially different from that which is worked by two shafts, except that the air current is stronger.

It is thus evident that the greater the depth of a mine so much the easier should be its ventilation; and that mines in districts where the difference between summer and winter temperature is great are more readily ventilated than mines in districts where the difference of summer and winter temperature is not so great.

The main difference in the case of a mine ventilated by a pair of shafts, and of a mine ventilated by one shaft and an adit level, are—

1.—In the case of a mine ventilated by two shafts there is, *a priori*, no reason for the air current to move in one direction rather than the other; and in the case where the air of the mine is warmer than that at the surface, the air will be in a state of unstable equilibrium, or stagnation, until some secondary cause (such as the falling of water down one shaft) determines the direction of the current. A stagnation of the air current occurs in the case of a mine ventilated by two shafts, whenever the air of the mine is of the same or a lower temperature than that at the surface; whilst in the case of a mine worked with one shaft and an adit stagnation of the air current can only occur when the temperature of the air of the mine is the same as that at the surface; so that a mine with an adit and shaft may be well ventilated on one of the hottest summer days, whilst the air in a mine with two shafts would be perfectly still.

2.—The case where a mine is ventilated by two shafts, but the mouth of one at a much lower level than the mouth of the other can be considered as equivalent to two currents, the one being equal to that which would be produced in the mine with two shafts of the length of the shorter shaft, and the other current produced by a shaft and adit, the depth of the former being equal to the difference in length between the two shafts.

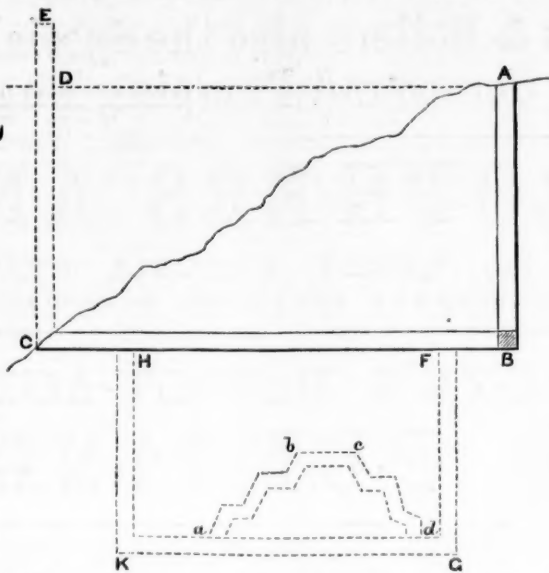
The main arguments deduced from the above figures are but slightly affected by the fact that owing to the burning of lights and the breathing of men and horses, &c., the temperature of the air is in most all cases two or three degrees higher than the temperature of the rock.

In the case of driving adits or tunnels which have only one opening, during the time they are being driven the fresh air will enter, and pass along next the roof and return along the floor in summer; but the contrary will take place in winter. In the case of sinking a shaft there will be a descending current next the sides, and an ascending current in the centre, so long as the rock and air temperature in the shaft is greater than the temperature of the air at the surface. Should the temperature at the surface become greater than that of the air in the shaft stagnation will take place. By dividing the shaft with brattice work two separate air columns are formed, and the strength of the air current is increased. Similarly in the case of an adit or tunnel, the strength of the air current can be increased by fixing a horizontal brattice partition at a convenient height above the floor.

Before proceeding further it will be necessary to consider the theory of a motion of the atmosphere on the production of an air current. We have said that every motion of the atmosphere is due to a change in the pressure of the atmosphere. A change in the pressure of the atmosphere can be produced either by a change of temperature or by a change of density. Natural ventilation is due

entirely to change of temperature. Artificial ventilation may be produced by changing the temperature of furnaces, or by changing the density by mechanical means (ventilating fans, &c.)

In discussing the theory of natural ventilation we shall take the case of a mine worked by an adit and a shaft as the one most general in practice, when no artificial means are used to assist or produce



the ventilation. In the accompanying figure let A B represent the shaft and B C the adit; then no current will move along the adit unless the pressures at the two ends, B and C, are different. Suppose C D represents a vertical column of air of the same section as the shaft over the mouth of the adit, and that it is carried up to the level D A of the mouth of the shaft. It will be evident that the superincumbent pressure of the atmosphere on the top of the shaft air column will be the same as on the top of the air column, C D, in the same level as the mouth of the shaft; and, therefore, that any difference in pressure of the air at B and C must be due to the difference in weight of the air columns, A B and C D. Supposing that the temperature of the mine is greater than that at the surface, the shaft air column will be lighter than the column C D. If the air column, C D, was raised to the same temperature as the air in the shaft A B without any change in the barometric pressure, the air would expand, and fill a larger volume. Supposing, then, that the air column C D was allowed to expand upwards, so as to lengthen the column C D, without any alteration of its sectional area, then the length of this surface column, C E, compared with the depth of the shaft A B, is given by a simple rule that "the height of the motive column is equal to the depth of the shaft multiplied by a factor obtained by dividing (the temperature in mine minus temperature on surface) by (459 plus the temperature on surface)." [The portion quoted replaces formulae which cannot be conveniently printed, and are for other reasons inadmissible in a newspaper; and which, moreover, are chiefly valuable for blackboard illustration.—Ed. M. J.]

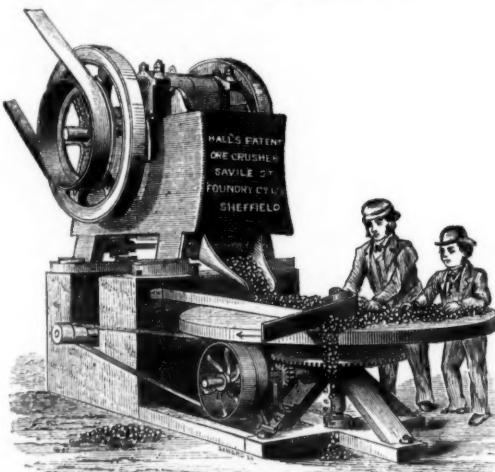
It has been found by experiment that the velocity with which air would flow through an orifice in a vessel, or through an adit or communication between two shafts, would (provided there were no frictional or other resistances) be the same as that acquired by a body falling through the height of the motive column. By the laws of falling bodies the velocity acquired in falling through any given height is equal to eight times the square root of the height. We have, therefore, the velocity of the air along a level (provided there were no frictional or other resistances) equal to eight times the square root of the number expressing the height of the motive column in feet.

From the formula used the following general conclusions may be drawn when frictional and other resistances are not taken into account:—1. The velocity is proportional to the square root of the depth of the shaft. 2. The velocity is proportional to the square root of the difference of the temperature at the surface and underground.

From what we have mentioned in a previous number respecting the difference in composition of the return and the intake air currents, it will be evident that the calculation for the amount of ventilation is not so simple as given by the above rule, but that the amount of moisture and the percentage of other gases, which may be lighter or heavier than pure air, should be ascertained, and the relative density of the return air current thus deduced, and from this the value for the height of the motive column ascertained.

MULTIPLE ACTION ORE CRUSHER, WITH PICKING TABLE—HALL'S PATENT.

MANUFACTURED BY THE SAVILE-STREET FOUNDRY AND ENGINEERING COMPANY, SHEFFIELD.



We illustrate above a convenient arrangement of crusher and picking table for the reduction and separation of ores of different kinds, which will be found extremely useful in mines where several minerals are found associated together, as, for instance, lead and copper, lead and zinc, &c., or in cases where ore is found in considerable pieces combined with the matrix, which becomes detached in solid lumps during the process of crushing, and where it is desirable to separate the same from the poorer stuff without further treatment, as is the case frequently in lead and copper mines.

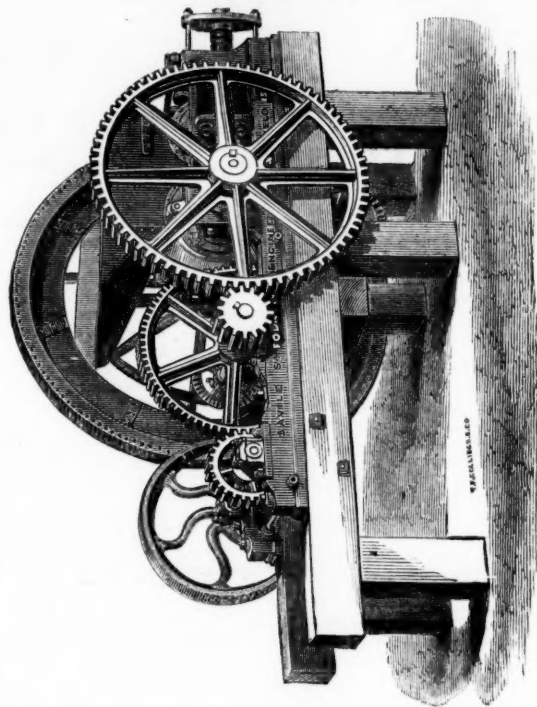
In dealing with the more precious metals, such as silver, &c., an arrangement of this kind will often commend itself to the mines. Its operations may be two-fold—either to separate the dead stuff from the ore, which requires further reduction, or to take out the solid ore, which requires no further treatment from the rest which is passed to the rolls. This is effected in the following manner:—Below the ore crusher at its end is carried upon a frame a slowly rotating table, placed horizontally, around which boys and girls stand sorting the ore. Upon the top of a vertical shaft a curved wiper is

loosely mounted, held by a fixed bracket from some portion of the foundation or frame of the crusher, so that as the table passes slowly underneath the wiper the contents are swept off to one side, leaving the rim clear to receive fresh material from the spout of the crusher.

The machine is usually somewhat elevated, and receives the ore as it comes from the mine, and reduces it to the requisite sizes, which are deposited on the outer edges of the table. Motion is communicated to the latter from the eccentric shaft of the crusher by a belt passing over a pulley on the countershaft fixed under it, as shown: on the opposite end of said shaft another pulley drives a short shaft, which has a fast and loose pulley at one end, and at the other a bevil pinioned gearing, with a bevil wheel secured to the underside of the table. If a very slow motion is required this can be effected by a worm and worm wheel. The picking table and its accompaniments are self contained, and can be freed or removed at will. The crusher we have previously described, and need not say more than that it is largely used by some of our most successful mining companies.

This combination is made in all sizes to suit machines from 12 in. x 5 in. to 21 in. x 9 in. at the mouth, and capable of an unlimited amount of work. The tables are larger than usually supplied with such crusher, affording greater facility for work and more room.

IMPROVED CORNISH CRUSHER.



Other improvements which have been introduced by the Savile-street Foundry Company into their crushing machinery deserve the attention of miners. We allude to their self-contained Cornish Crusher, which one would think, from its antiquity, had arrived at finality long ago. This we illustrate at Fig. 2. The primary object intended and secured has been to make each machine independent of extraneous fixing; in other words, they are "self-contained," like the stone-breaker, and this object has been obtained without sacrificing any advantages of the old plan of construction, whilst the cost of fixing is greatly reduced, and one-half the foundation only is required; indeed, beyond levelling on a sound bed there is nothing else wanted. Only those who have had to erect such machinery can appreciate this fact. All the strains and shocks are self-contained, and although it involves necessarily a heavier machine throughout than hitherto used to absorb them, we think the advantages too great to pass unnoticed. Heavy weights and levers to relieve the expanding roll are dispensed with, and an effective slightly elastic medium introduced, which can be regulated according to the hardness of the material under treatment. The machine runs more smoothly, deals with the ore more effectually, and consumes less power by an absence of severe shocks and vibrations so destructive to foundations and gearing.

A wrought-iron raft wheel elevator, with T-iron spokes secured to a central metal box, dispenses with the costly and inefficient old plan of building them up in wood. They are made in various sizes to suit the quantity and hardness of the ore, and can be driven direct from a water-wheel or by gearing from an engine. The shells of the rolls are renewable, and of the high quality of chilled iron for which the company are now noted. Incidentally, we may remark, they have largely superseded the famous American chilled rolls for paper makers and callendering, &c., both here and on the Continent.

MINE TIMBERING.—The paper on this subject, communicated to the Chesterfield and Derbyshire Institute of Mining, Civil, and Mechanical Engineers by Mr. J. CLARK JEFFERSON, A.R.S.M. Wh. Sch., which formed part of the business of the April meeting, has been reprinted in separate form (London: Bemrose and Sons, Paternoster Buildings), and will be found of great practical utility. The author acknowledges as his sources of information his Clausthal lecture notes (with which the readers of the *Mining Journal* are already familiar), Lottner's *Bergbaukunde*, Sichel's *Grubenbau*, and Jacinsky's *Grubenerhaltung*. The volume is admirably illustrated by 38 well executed lithographs, showing the various methods of timbering under different circumstances, so that the Chesterfield and Derbyshire Institute may be congratulated upon having in a single paper secured a valuable treatise upon a subject of paramount importance to the majority of its members.

ROYAL CORNWALL POLYTECHNIC.—The new volume of Transactions—the 47th Annual Report—of this Society (price 2s. 2d. post free) has just been issued. In addition to the report, balance-sheet, and general business details, the volume contains a large amount of information in the form of descriptive notes of the numerous inventions exhibited at the annual competition for prizes, and interesting technical papers, including Natural History Notes, by Mr. Howard Fox, in which are given accounts and figures of the flying squid or calamari, and of *Centropomus pomilus*, taken near Falmouth. The form of this latter differs so far from the figures previously given by Couch and Yarrell that they are worthy of careful study.

GAS WORKS AND GAS LIGHTING.—The admirable treatise on the Construction of Gasworks and the Manufacture and Distribution of Coal Gas, by Mr. SAMUEL HUGHES, C.E., which, originally formed one of Mr. Weale's Rudimentary Series, for many years enjoyed a high reputation among practical men, but the progress of invention and discovery, and the change of practice, rendered certain descriptions of matters of detail antiquated in some cases, and incomplete in others. The sixth edition (just issued by Messrs. Crosby, Lockwood, and Co., of Stationers' Hall Court) has been completely revised and modernised, re-written, and much enlarged, by Mr. Wm. Richards, C.E., so that it is now as completely a work of the day as was Mr. Hughes's at the time of its original issue. The work is complete from the placing of the coal in the retort to the consumption of the gas in the burner, whilst by way of introduction there is a good historical sketch of gas lighting and chapters on the chemistry of the subject, so that all the information likely to be required will be readily found.

Being Notes on a Course of Lectures on Mining, delivered by Herr Berggrath, Director of the Royal Bergakademie, Clausthal, The Harz Mountains, Germany.



PARIS EXHIBITION, 1878.

GOLD AND SILVER MEDALS AWARDED for
Steam-Engines & Boilers, also the Special Steam Pump,
and Compound Pumping Engine.

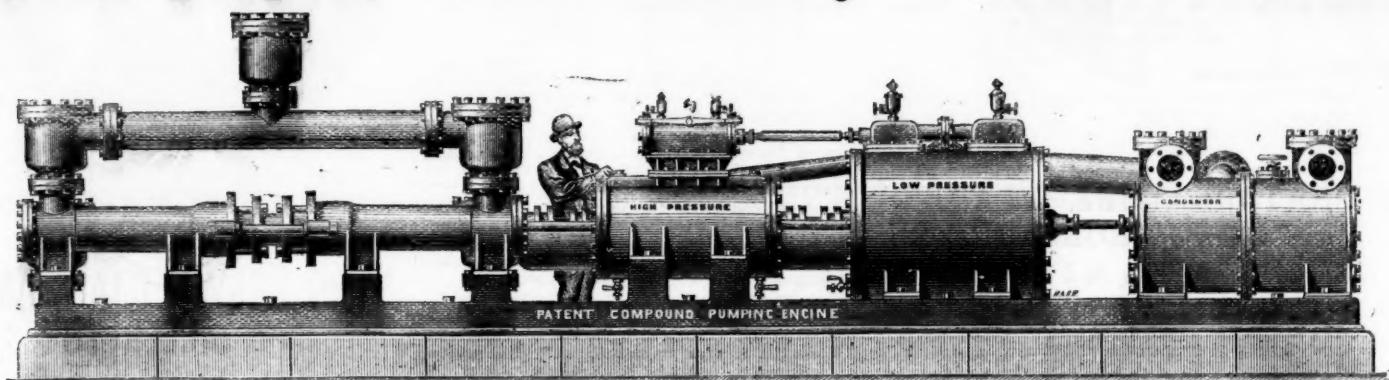


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AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

TANGYE'S DIRECT-ACTING
COMPOUND PUMPING ENGINE,

For use in Mines, Water Works, Sewage Works,
And all purposes where Economy of Fuel is essential.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY
IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine :—

TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

21" Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.
36" x 10" x 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.
Messrs. Tangye Brothers.
GENTLEMEN,—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Valve. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.
Yours respectfully,
(Signed) JOHN R. FORSTER, Engineer.

The Chesterfield and Boythorpe Colliery Company (Limited).
Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.
36" x 12" x 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINE.
Messrs. Tangye Brothers. Supplied in January, 1878.
GENTLEMEN,—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs. per square inch. We can work the pump without any difficulty at 28 strokes per minute—224 ft. piston speed. The pumping power is enormous. The vacuum in the condenser being from 12 to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring this pump into great requisition.
Yours truly,
(Signed) M. STRAW, Manager.

SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder.....In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14
Ditto of Low-pressure Cylinder	14	14	14	18	18	18	18	21	21	21	21	24	24	24
Ditto of Water Cylinder	4	5	6	5	6	7	8	6	7	8	10	7	8	10
Length of stroke	24	24	24	24	24	24	24	24	24	24	24	36	36	36
Gallons per hour approximate	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	330	160	360	250	184	140	360	264	202	150	360	275	175
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	293

CONTINUED.

Diameter of High-pressure Cylinder	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30
Ditto of Low-pressure Cylinder	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52
Ditto of Water Cylinder	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12
Length of stroke	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,950	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937

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Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

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TWO GOLD MEDALS.

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DESIGNED FOR USING COMPRESSED AIR OR STEAM.

SIMPLE, COMPACT, PORTABLE.

Silver Medal, Royal Cornwall Polytechnic Society, 1876.

No. 1 size, 7 in. single cylinder, with 2 ft. drums.
No. 2 size, 9 in. single cylinder, 2 ft. 6 in. drums.
A.—6 in. double cylinder, with 2 ft. 3 in. drums.
B.—8 in. " " 3 ft. 0 in. drums.
C.—10 in. " " 3 ft. 6 in. drums.
D.—12 in. " " 4 ft. 6 in. drums.
E.—14 in. " " 5 ft. 0 in. drums.

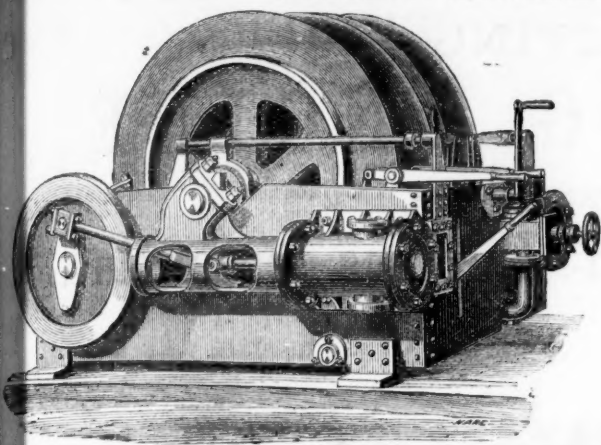
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[This Advertisement appears fortnightly.]



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THE BEST METAL FOR

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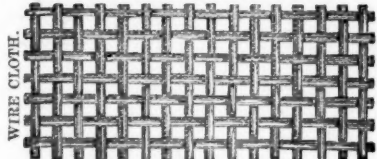
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Millimeter holes perforated in sheet-copper, brass,
IRON, steel, and zinc.Lineal holes per inch woven in copper, brass,
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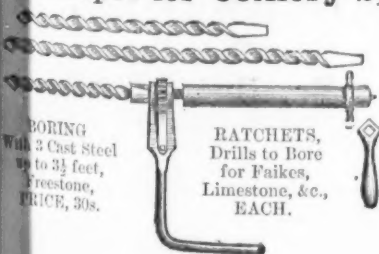
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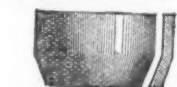
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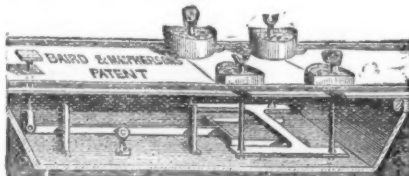
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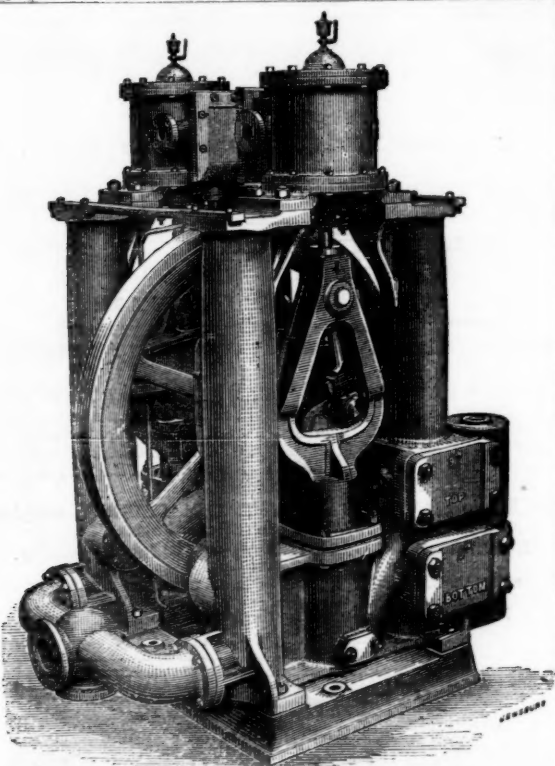
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